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COVER

Cypress Lake on the campus of The University of Southwestern Louisiana. This is one of the many places to visit while attending the 44th Annual Meeting of the Association of Southeastern Biologists, April 13-16, 1983.

PATRON MEMBERS

Carolina Biological Supply Company, Burlington, NC
Parco Scientific Company, Vienna, OH
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Martin Instrument Company, Greenville, SC

TIME AND PLACE OF FUTURE MEETINGS

1983	April 13-16	University of Southwestern Louisiana, Lafayette
1984	April 11-14	Memphis State University
1985		Middle Tennessee State University, Murfreesboro
1987		University of Georgia, Athens (50th Anniversary)



About the Lafayette Meeting

The Association of Southeastern Biologists will hold its 44th Annual Meeting April 13–16, 1983, at The University of Southwestern Louisiana in Lafayette, Louisiana. Registration, exhibits, paper sessions, and the symposia sessions will be in the USL Conference Center on Rex Street. The general session with the feature address will be held in the Angelle Hall Auditorium on East St. Mary Street. The Friday night banquet and its associated events will occur in the Conference Center.

To facilitate the organizational work of the Local Arrangements Committee, ASB members and friends are urged to PRE-REGISTER for the Lafayette meeting by using the pre-registration form provided in this issue.

The University of Southwestern Louisiana welcomes all ASB members and interested biologists to the 1983 meetings both for its professional aspects and for an experience of the unique culture of Cajun Louisiana.

SOCIETIES MEETING WITH ASB IN LAFAYETTE

Beta Beta Beta, Southeastern Region
Botanical Society of America, Southeastern Section
Ecological Society of America, Southeastern Chapter
Southeastern Society of Parasitologists
Southern Appalachian Botanical Club
Crustacean Society

LAFAYETTE AND THE UNIVERSITY OF SOUTHWESTERN LOUISIANA

Lafayette is the hub city of Acadiana, the region that was settled by French-Canadian refugees in the mid-eighteenth century. After they were expelled from Nova Scotia by the British and dispersed among several countries, the Acadians (Cajuns) made their way to southwestern Louisiana, then a French possession, to reconstitute their community. Acadian culture has dominated southwestern Louisiana for 200 years. However, strong elements of Spanish and Afro-American heritage are also found in the food, music, and folk customs of Acadiana.

Lafayette is a fast-growing city of 82,000 with the economy based principally on energy production. Agriculture and fisheries are secondary pillars of the local economy. Lafayette is renowned for its excellent restaurants and, in fact, has the nation's second highest per capita annual expenditure on dining and entertainment.

The University of Southwestern Louisiana has a student body of 15,000. USL was founded in 1900 as Southwestern Louisiana Institute, and became a university in 1960. USL is organized into eight colleges and a graduate school. Master

ASB PRE-REGISTRATION FOR LAFAYETTE MEETING

(Type or print; one form for each registration)

(Duplicate as needed)

Name _____

Institution _____

City _____ State _____ Zip Code _____

Place a check mark in the appropriate blanks.

REGISTRATION

Regular \$8.00 _____ Student \$4.00 _____

(Registration at meeting will be: Regular \$10.00; Student \$5.00)

MEALS

ASB Banquet		SE Chapter, Ecological	
Regular _____	\$10.00 _____	Society of America	
Student _____	\$ 8.00 _____	Luncheon _____	\$ 8.00 _____
Crustacean Society		SE Society of Parasitologists	
Luncheon _____	\$10.50 _____	Luncheon _____	\$ 8.00 _____
Beta Beta Beta		Southern Appalachian	
Luncheon _____	\$ 6.00 _____	Botanical Club/SE Section,	
		Botanical Society of America	
		Breakfast _____	\$ 5.00 _____

FIELD TRIPS

Crawfish Industry		Atchafalaya Basin	
Tour _____	\$ 3.00 _____	Canoe Trip _____	\$22.00 _____
Weeks-Avery		Coastal Estuary	
Islands _____	\$10.00 _____	Cruise _____	\$ 8.00 _____

Make check for total amount payable to ASB.

Send a completed copy of this form and your check *by April 1st* to: ASB Pre-registration, Department of Biology, University of Southwestern Louisiana, Lafayette, LA 70504.

of Science degrees are offered in 30 disciplines and Ph.D. degrees in 5. Two of the Departments that grant doctorates, Computer Science and English, are nationally recognized for their quality.

The Department of Biology offers six undergraduate curricula: botany, zoology, biology-chemistry, pre-physical therapy, wildlife management, and aquatic and fisheries biology. Graduate programs in the Department are the M.S. in

Biology, and the Ph.D. in Environmental and Evolutionary Biology. The Department has a faculty of 20. Particularly active areas of faculty and graduate student research include cryptogamic botany, arthropod systematics and environmental physiology, and ecological-evolutionary aspects of herpetology. Editorships or associate editorships of several professional journals are now, or have been, located in the Department; these include *Estuaries*, *The Journal of Crustacean Biology*, *The Bryologist*, and *Herpetologica*.

PRE-REGISTRATION AND REGISTRATION

A PRE-REGISTRATION form is provided with this copy of the bulletin. Pre-registration will better enable us to provide services and facilities that you expect at the ASB Annual Meeting. Registration and late registration will be in the lobby of the Conference Center on Wednesday from 5–9 P.M. and on Thursday 8 A.M.–5 P.M. Note that PRE-REGISTRATION is cheaper. Limited numbers of tickets will be available for breakfasts, luncheons, the banquet, and the field trips at late registration. SABC/SE-BSA members please note that tickets are needed for the Friday breakfast. Use the pre-registration form.

TRAVEL TO LAFAYETTE AND THE UNIVERSITY OF SOUTHWESTERN LOUISIANA

Automobile—Lafayette is located on Interstate 10. Members driving from the east or west should exit I-10 onto U.S. 167 South. Those approaching directly from the north will be on U.S. 167 as they enter Lafayette. Consult the map to be published in the April, 1983, ASB Bulletin to find parking areas near campus.

Air Service—The Lafayette Regional Airport is located approximately two miles east of the USL campus. Connections between Lafayette and New Orleans, Baton Rouge, and Houston are provided by Texas International, Royale, Hammond, and Metro Airlines, but groups of two or more flying into New Orleans may find it less expensive to rent a car there and drive to Lafayette. Cars may be rented at the Lafayette airport from Avis, Hertz, and National. Taxi service to the USL campus or to a nearby motel should cost about \$2.00.

Bus Service—Lafayette is served by Greyhound Bus Lines. The terminal is a block from Johnston Street, which would lead one southwestward to the USL campus about 8 blocks away.

DINING FACILITIES AND LOCAL ALCOHOL MORES

Sampling of the regional cuisine is a major reason to visit Acadiana. A list of restaurants and boudin (boo dan) sellers will be provided to all registrants at the meeting. The meals offered on the pre-registration form will be Acadian in flavor.

There are few restrictions, although drinking while driving was recently outlawed within the city limits.

ACCOMMODATIONS

Excellent and reasonably priced lodging is available in the USL Conference Center. The least expensive rooms in the Conference Center have twin beds and a bath shared with another room. Sharers of a bath will be of the same sex. Since virtually all of the official events of the meeting will occur in the Conference Center, it is the most convenient lodging available. These rooms are cheaper and more convenient than those of any motel in Lafayette.

Reservations for lodging should be made by using the form provided. Duplicate as needed. Alternatively, you may make reservations by calling (318) 233-9350. If you reserve by phone, ask to be sent written confirmation of your reservation.

When the Conference Center is filled, a reservation will be booked for you in one of three nearby motels (Howard Johnson's, Holiday Inn, and Sheraton Townhouse). The motels will be asked to confirm your reservation.

CAMPING FACILITIES

Acadiana Trailer Park Camp Ground—Located on East Alexander Street off of Moss Street in the northeastern corner of Lafayette. Cost: \$5.00/night for tent or camper, with electricity. Phone: (318) 234-3838.

KOA Campground—Located on the south service road (Ossun Rd.) of I-10 at Scott, approximately 4 miles west of Lafayette; exit I-10 at Hwy. 93 toward Scott. Cost: \$11.00 for two people/night with full hook-up; \$1.50 for each additional person. Phone: (318) 235-2739.

GENERAL SCHEDULE

Wednesday—Field Trip: Crawfish Industry Tour: Begins at 1 P.M. at USL Conference Center.

Registration: 5–9 P.M.: Conference Center lobby.

Executive Committee meeting: 7:30 P.M.: Conference Center.

Thursday—Registration: 8 A.M.–5 P.M.: Conference Center lobby.

General Plenary Session: 8–9:30 A.M.: Angelle Hall Auditorium. Welcome to USL, general announcements, and feature address.

Symposium: Wetland Environments of the Southeast. Part I. Biota and Environment. 9:45 A.M.–noon: Conference Center. Part II. Selected Wetland Conservation Issues in the Southeast. 1:30–4:30 P.M.: Conference Center.

Paper sessions, placement service: Conference Center.

Exhibits: Conference Center lobby.

Business meetings and luncheons of Southeastern Society of Parasitologists and Southeastern Chapter of the Ecological Society of America: Conference Center.

Hospitality Session: Beer, soft drinks and Cajun music. 7–10 P.M.: Location to be announced.

Friday—Society and group breakfasts, business meetings: 7–9 A.M.: Conference Center.

USL CONFERENCE CENTER

LODGING RESERVATION REQUEST FOR ASB MEETING (APRIL 13-16, 1983)

Name _____

Address _____ Phone (____) _____

City _____ State _____ Zip _____

Please reserve the following accommodations for me (circle your choice). If room is not available at rate requested, I will accept reservations at nearest available rate (except for suites).

	Shared Bath	Private Bath
Room with one double bed (1 person)	\$20	
Room with two double beds (1 person)	\$27	
Room with Queen-sized bed (1 person)	\$27	
Room with two twin beds (1 person)	\$16	
Suite with one double bed (1 person)		\$47
Suite with two double beds (1 person)		\$47

Note: Add \$4 for each additional person and 7% tax.

I would like to share a room with _____.

Date of Arrival _____ Time of Arrival _____ Date of Departure _____.

It is the policy of the Conference Center that the first night's lodging must be paid 72 hours in advance of arrival. Notification of cancellation is required 72 hours prior to stated arrival time for a refund.

Payment may be by MasterCard, Visa, or personal check.

Mail a copy of this form to: USL Conference Center
P.O. Box 43372
Lafayette, LA 70504

Or call for reservations at (318) 233-9350 between 8 A.M.-5 P.M.

Symposium: Wetland Environments of the Southeast. Part III. The Atchafalaya Bay-Basin Ecosystem. 8-10:30 A.M.: Conference Center.

Symposium: Origins and Distribution of Caribbean-Gulf of Mexico Crustacean Fauna. 8 A.M.-5 P.M.: Conference Center.

Paper sessions, placement service: Conference Center.

ASB Business Meeting: 11 A.M.-noon: Conference Center.

Exhibits: Conference Center lobby.

Business meetings and luncheons of Beta Beta Beta and The Crustacean Society: Conference Center.

ASB Banquet: 8 P.M.: Conference Center.

Saturday—Executive Committee Meeting: 9 A.M.: 214 Billeaud Hall.

Field Trips: Begin between 7–8 A.M. (depending upon the trip) in parking lot behind Dupre Library adjacent to Billeaud Hall.

POINTS OF INTEREST IN THE LAFAYETTE AREA

Lafayette Natural History Museum and Planetarium—A small but excellent interpretive museum that emphasizes the regional environment. It will feature a wildflower exhibit at the time of the ASB meeting. Located between the Municipal Auditorium and Girard Park Drive near the USL campus. Open 8 A.M.–5 P.M. Wednesday and Friday; 8 A.M.–9 P.M. Thursday; 1–5 P.M. Saturday. (318) 261-8350.

Lafayette Museum—Local historical memorabilia, period furnishings, and Mardi Gras costumes. Located at 1122 Lafayette Street near the USL campus. Open 9 A.M.–noon and 2–5 P.M. Tuesday through Saturday. (318) 234-2208.

The Art Center for Southwestern Louisiana—A fine collection of 19th century Louisiana paintings, 17th and 18th century European paintings and monthly contemporary, and decorative or special interest exhibits. Located at the corner of Girard Park Drive and East St. Mary Street near the USL campus. Open 9:30 A.M.–4:30 P.M. weekdays. (318) 232-1169.

Heymann Oil Center—This several square-block area houses operations of many Gulf Coast oil and gas companies. Located between Pinhook Road and Girard Park Drive.

Acadian Village and Tropical Gardens—An authentic recreation of an old south-Louisiana bayou town. The Tropical Gardens feature plants native to the Gulf Coast, the neotropics, Asia, and Oceania. Located off Ridge Road (Highway 733), which is reached by taking U.S. 167 toward Abbeville for approximately four miles beyond the USL campus. Open 10 A.M.–5 P.M. (318) 981-2364.

Evangeline Downs—Thoroughbred racing with pari-mutuel wagering. Racing season is April–August. Located on U.S. 167 north of I-10 in Lafayette. For exact racing dates and information, call (318) 896-6185.

Shadows-on-the-Tech—A restored antebellum townhouse of the plantation-owning Weeks family. Located at 117 East Main Street in New Iberia, about 30 miles south of Lafayette on State Highway 182. Open 9 A.M.–4:30 P.M. daily. (318) 369-6446.

St. Martinville—The culture of the Acadians has survived more nearly intact in small towns like St. Martinville than in cities like Lafayette. Founded in 1761, it is the home of Longfellow's Evangeline. St. Martin's Church on Main Street was established in 1765. Located on State Highways 96 and 31.

Lafayette Convention and Visitors Commission—P.O. Box 52066, Lafayette, LA 70505; (318) 232-3737. Write or call for information on points of interest in Lafayette and Acadiana.

FIELD TRIPS

Wednesday—LOUISIANA CRAWFISH INDUSTRY TOUR (1–6 P.M.): This tour will visit working crawfish farm and marketing facilities in the vicinity of Lafayette, where culture of *Procambarus clarkii* is a major industry. Methods of pond construction, management, and harvesting will be featured. The trip will also include a visit to a wholesale buyer and a crawfish peeling plant. The trip will depart from the USL Conference Center. It will be led and hosted by Mr. Donald Gooch of the USL Crawfish Research Center. Limited to 20 persons; the \$3 fee covers costs of transportation. Those participants that wish may reassemble, after return to the Conference Center and a short break, for transportation to a local restaurant featuring crawfish dishes; the dinner party will depart from the Conference Center at 7:00 P.M., and participants will be responsible for coverage of their individual dinner costs which will vary depending upon their selections from the menu.

Saturday—FEARMAN BAYOU AND COASTAL ESTUARY (8 A.M.–5:30 P.M.): This trip will take you to the mouth of the Vermilion River and, by powerboat from there, through marshlands on the western shores of Vermilion Bay. The boat trip will traverse areas of fresh, brackish, and intermediate salinity marsh. Included will be marsh lakes and tidal streams of the Fearman Bayou complex on the State Wildlife Refuge, where a small field station is maintained by the Louisiana Universities Marine Consortium (LUMCON). The avifauna, mammals, alligators, marsh vegetation, and other aquatic life of this area are of particular interest. The trip will be led by members of the LUMCON scientific staff. It will depart from near the USL Conference Center. Limited to 20 persons; the \$8 fee covers land and water transportation, guides, and lunch at the field station.

ATCHAFALAYA BASIN CANOE TRIP (7 A.M.–6 P.M.): This trip will take you into Buffalo Cove and Lake Grevenberg in the Atchafalaya Basin. These areas contain impressive cypress swamps and are considered to be among the most picturesque of the Basin. This large low-lying area has had its topography shaped by former Mississippi River systems. Today, the Basin is the largest inland swamp of its kind in North America. It serves as a floodplain for the Atchafalaya and Mississippi Rivers. The canoe trip will cover approximately 8 miles of waterways. Transportation to the launch site will depart from near the USL Conference Center. Limited to 15 persons; the \$22 fee covers land transportation, canoe rental, guides, and a picnic lunch.

WEEKS AND AVERY ISLAND BOTANICAL TRIP (7:30 A.M.–6 P.M.): This excursion will take you to two of the "Five Islands" of Louisiana. The "islands" are actually elevated areas upthrust above the surrounding lowlands and are usually referred to as salt domes. Avery Island attains a height of just over 150 feet and is the highest of the Five Islands. The islands are of particular interest in that they offer a wide variety of habitats, ranging from fresh marsh, brackish marsh, and cypress-tupelo swamps to deep, shaded ravines in upland woods. Despite the fact that the islands have been occupied for many years, they support some relatively large areas of native vegetation, in addition to a striking assemblage of exotic species. Some areas serve as important refuge sites for wildlife. The trip will be led by Dr. Shirley Tucker of Louisiana State University and Mr.

Garrie Landry of the University of Southwestern Louisiana. It will depart from near the USL Conference Center. Limited to 20 persons; the \$10 covers transportation, guides, and a picnic lunch.

LOCAL ARRANGEMENTS COMMITTEE

Chairman: James F. Jackson (318) 231-6756
Program: Victoria I. Sullivan (318) 231-6987
Pre-Registration and Registration: Robert G. Jaeger (318) 231-5235
Audio-Visual: Karen J. Fritze (318) 231-5236
Exhibits: Pegge L. Alciatore (318) 231-5705
Field Trips: Darryl L. Felder (318) 231-6753
Social Events: Mark A. Konikoff (318) 231-6754
Parking and Transportation: Matt E. Dakin (318) 231-6752
Lodging Reservations: USL Conference Center (318) 233-9350

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. J. Charles O'Kelley, Biology Dept., Univ. of Alabama, University, AL 35486.

Name in full _____ Date _____

Title _____ Department _____

Institution _____

City _____ State _____ Zip _____

Preferred mailing address (if different from above) _____

Degrees (institutions and dates) _____

Recommended by member _____

Annual Dues: _____ Graduate student \$5.00 _____ Regular \$10.00
 _____ Contributing \$12.00 _____ Sustaining \$25.00
 _____ Family \$12.00 _____ Library subscription \$12.00

Association Affairs

BULLETIN TO PUBLISH RESEARCH PAPERS

The ASB Bulletin will publish research papers of interest to the biologists of the Southeast. Broad-topic, review articles are considered to be particularly appropriate. Manuscripts will be considered only if the author (or co-author) is a member of ASB. There is no page limitation, but full page charges must be paid by the author(s). These are \$50 per printed page plus actual charges for figures, tables, mathematical notations, and author's changes after page proof. Authors should follow the format established in the paper by Cammen *et al.*, *The ASB Bulletin* 29: 111-134, 1982. All manuscripts, including figures, must be submitted to the Editor in triplicate. All typing should be double-spaced. Each manuscript will be reviewed by at least two referees. Authors will receive page proofs and a reprint order blank. Proofs must be returned to the Editor within one week of receipt. Publication time can be as short as 4-6 months depending upon the condition of the manuscript.

Members are encouraged to send manuscripts to the Editor for the series on "Featured Research Program." See *ASB Bull.* 28: 122-123, 29: 13-15, and 29: 135-138 for format. This is a good way to publicize your research program and for all members to learn what is going on in the Southeast.

The Editor also wishes to receive short, one-paragraph, informative reviews of new books of interest to southeastern biologists. Follow the format established in this issue.

CONSERVATION UPDATE

In a article entitled "A Role for ASB: Seeking A Resolution of the Global Dilemma," printed in the July 1981 *ASB Bulletin*, the Conservation Committee outlined a policy statement passed by the North Carolina Academy of Science (NCAS) in 1980. The statement called on colleges and universities to make a greater commitment to interdisciplinary undergraduate teaching about three interrelated global problems: population growth, resource depletion, and environmental degradation. The NCAS is advocating education which provides students with an opportunity to gain a real understanding of the role these three problems play in the world today.

This article is an update of the NCAS efforts. It is also a mirror to reflect the role of ASB in the NCAS proposal, in conservation issues, and in educational policy in general. The Conservation Committee of ASB hopes this article will create interest in developing a forum to discuss these issues.

The inadequate understanding and recognition of these issues was identified by the NCAS and by the federal government's Global 2000 Report as central to the current human dilemma. Recognition of the interrelatedness of population growth, resource depletion, and environmental degradation has been slow for several reasons: (1) the perception that the problem is scientific and technological in nature; (2) the perception that each issue is a separate problem; and (3) the lack of adequate education of the public concerning issues. Existing efforts at educating undergraduates about these issues are impeded by departmental categories which hinder the formation of interdisciplinary courses.

A new approach is needed. The NCAS document requests that each North Carolina institution of higher learning appoint a review committee to examine undergraduate teaching in the three areas of population, resources, and the environment, to suggest how the teaching of these issues could be made more effective, and to evaluate a series of topics suggested by the Academy. The NCAS has pledged their support and assistance in this endeavor.

To follow up the adoption of the policy statement, several meetings have been held to bring together concerned faculty from across the state. Teams of NCAS officers and members have visited a number of North Carolina colleges and universities to meet with administrators and faculty, discuss the institutions' existing population-resource-environment education program and urge development and strengthening of interdisciplinary undergraduate courses in this area. Schools which have been visited to date include: UNC-C, UNC-CH, UNC-G, UNC-W, Appalachian State University, Eastern Carolina University, Davidson, Duke, Guilford, and Catawba. At some schools the statement has been circulated by the administration to all faculty, and at several it is being considered by committees that review the curriculum and recommend new course additions.

The goal of effective interdisciplinary education concerning population, resources, and the environment can be reached by many different approaches. The NCAS now is actively collecting information on potential curricula, and would like to design two basic courses, one for small colleges and another for large universities. The NCAS is working cooperatively with the Educational Development Center of Massachusetts in designing a model program to promote such education. The program will include development of curriculum materials and the training of professional teams to teach courses. Both the materials development and the team training will occur during a two-month institute to be held in North Carolina in the summer of 1984.

The NCAS program is unique. It is the first professional organization in the country to promote a cooperative state-wide effort to educate undergraduates about these three global problems. The Conservation Committee recognizes the importance of such an educational effort and will propose a resolution to the membership of ASB at the 1983 business meeting in support of such efforts in the southeast. ASB is the most extensive science-educator organization in the southeast, and the committee feels that it is an appropriate source and focus for the education of undergraduates in the region on population growth, resource depletion, and environmental degradation.

The current Conservation Committee supports the proposals put forth by the Conservation Committee of 1980. The organization of symposia and workshops, assistance to universities and colleges in the development of curricula and in teaching, and the education of decision makers are legitimate and essential activities of ASB. We as scientists, professionals, and citizens have a responsibility to provide such an education to students and information to decision makers. But, the success of this kind of education program ultimately rests on the commitment of faculty and administrators and their willingness to work together to promote it.

The Conservation Committee plans to lead a brief discussion of this issue during the 1983 ASB business meeting. Do you agree that ASB is an appropriate focus for this in the southeast? The Conservation Committee encourages your comments and suggestions.

—ASB Conservation Committee
Douglas A. Rayner, Chairman
Diane T. Wagner-Merner
Robert D. Sutter

New Books

Schenck, N. C. (Ed.) 1982. Methods and Principles of Mycorrhizal Research. Amer. Phytopathological Society Books, 3340 Pilot Knob Rd., St. Paul, MN 55121. APS members \$22.00, non-members \$24.00. 256 pp. illus., hardcover.

This book deals with mycorrhizal general principles and research methods and is a single source of information on most aspects of this important group of organisms. It is a necessary reference for mycologists, plant pathologists, biology teachers, foresters, agronomists, horticulturalists, soil scientists, plant physiologists, and ecologists. (Ed.)

Cairns, J. Jr. and Collaborators. 1982. Biological Monitoring in Water Pollution. Pergamon Press Inc., Fairview Park, Elmsford, NY 10523. \$30.00. 144 pp. illus., hardcover.

With the growth of interest in the aquatic ecological effects of pollutants that has occurred in recent years, the indirect chemical and physical methods of assessing biological changes in water quality due to natural causes and human activities are being supplemented by actual observations, or biological monitoring, of the organisms that are affected. This book is concerned with the methods, advantages, difficulties, and future possibilities of biological monitoring. It includes the results of thousands of papers, 940 of which are cited in the bibliography. It is an important reference for workers in water management and water pollution control, sanitary and chemical engineering, biologists concerned with water pollution assessment, regulatory agencies, industry with waste discharges, environmental activist groups, ecologists, and limnologists. (Ed.)

Franz, Richard (Ed.) 1982. Rare and Endangered Biota of Florida, Vol. 6. Invertebrates. University Presses of Florida, Gainesville, FL 32603. 131 pp. illus., paper.

This handsome volume is a well-annotated listing of invertebrate species considered to be actually or potentially in danger of extinction or extirpation from Florida. It has been assembled by the editor from material supplied by numerous contributors. In the introduction, the editor outlines the format of the volume and discusses the problems facing many Florida invertebrates. Here too are defined the five status classifications into which species are placed: endangered, threatened, rare, of special concern, and status undetermined. Following the introduction are detailed descriptions of 24 terrestrial and aquatic habitats. The bulk of the volume consists of accounts of 218 invertebrate species, sub-species, or varieties. Grouped taxonomically, the majority of the accounts include subsections giving the description, range, habitat, life history and ecology, specialized and unique characters, basis of status classification, recommendations, and references. Many photographs, illustrations, and range maps are also presented.

One weakness of this publication is inconsistency of the sort that can be expected when many contributors are involved. Accounts in the Coleoptera and Odonata sections, for instance, are limited and do not follow the usual format. In another example, habitats given for many species do not reflect the classification of habitats so well outlined earlier. Two other points deserve mention. Accounts of each species are brief and this volume serves only as a starting point for further study. Finally, one may suspect that the species listed in any such work will be limited by the areas of interest and expertise represented in the region.

Certainly the strengths of this work outweigh its weaknesses. As noted above, it is handsomely done with very good illustrations or photographs of many species. The material presented in each account appears sound and useful. Subsections on range (accompanied by range maps) are especially

detailed and references provide an entry into more detailed literature. For the non-biologist interested in preservation of endangered species or for biologists beginning research on this subject, this will be a useful publication. (*P. Sterling Southern, Department of Entomology, NC State University, Raleigh.*)

Gude, W. D., G. E. Cosgrove, and G. P. Hirsh. 1982. Histological Atlas of the Laboratory Mouse. Plenum Press, 233 Spring St., New York, NY 10013. \$25.00. 151 pp. illus., paper.

This Atlas is based on the extensive reference collection of histology slides at the Oak Ridge National Laboratory. In order to judge the harmful effects of ionizing radiation, Oak Ridge produced a comparative collection of normal tissues. Besides serving as a text for histology courses that include mouse tissues, this collection of photomicrographs is useful for pharmacologists and toxicologists who need to determine if histological sections from their laboratory mice are abnormal. A brief descriptive overview of the organ systems is provided to compliment the explanatory notes on the 168 color plates. The end of the book includes clear, detailed directions on preparing the stains and fixatives needed to prepare the sections and a concise list of useful references for further information on histology and the laboratory mouse. (*Edward M. Croom, Jr., Research Institute of Pharmaceutical Sciences, University of Mississippi, University, MS*)

News of Biology in the Southeast

JON R. FORTMAN—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

University of Alabama in Birmingham, Department of Biology. *Dr. Thomas Federle* has been appointed Assistant Professor. Dr. Federle formerly completed his Post Doctoral Research at The Florida State University in Environmental Microbiology. *Dr. Duane Fong* has been appointed Assistant Professor. He was a former Research Associate at Rockefeller University in Molecular Cell Biology.

Auburn University, Department of Botany, Plant Pathology, and Microbiology. *Dr. Roland R. Dute* has joined the department as an Assistant Professor of Cell Science. Dr. Dute comes to Auburn from St. Ambrose College, where he taught botany for the past several years.

Tuskegee Institute, Department of Biology. *Dr. Douglas Hileman* (Ph.D. Botany, University of Michigan) has recently joined the department. His teaching will involve courses in botany and ecology. *Dr. James H. M. Henderson*, Professor of Biology and Chairman of the Division of Natural Sciences, has received the UNCF Distinguished Scholars award which carries a stipend for research in plant tissue culture. During the 1982 Annual Meeting of the AAAS, the Association for Puerto Ricans in Science and Engineering was formed. This association will work to advance the status of Puerto Ricans in Science and Engineering, to increase the flow of Puerto Ricans into these branches of science, and to facilitate communication among scientists and engineers on the mainland, and those in Puerto Rico. For more information contact *Edward Rosa-Molinar*, Regional Coordinator, Carver Research Laboratories, Tuskegee Institute, Tuskegee, AL 36088. A multidisciplinary scanning electron microscope facility, serving research investigators from all areas of the campus, has been opened under the direction of *Dr. Linda Washington*. Also, renovations are underway for the establishment of a cell culture center, also under Dr. Washington's supervision.

Florida

Florida Southern College, Department of Biology. *Dr. Robert Baum*, formerly visiting Assistant Professor of Plant Pathology at Clemson University, has assumed the position of Associate Professor of Biology.

University of Florida, Department of Botany. *Dr. Leland Shanor* has been designated as General Chairman for the Committee on Local Arrangements for the 1985 AIBS Annual meeting to be held at the University of Florida. AIBS last met on the campus in 1954. *Dr. Henry Aldrich* was recently elected Vice-President of the Mycological Society of America. *Dr. George Bowes* has been appointed to the Editorial Board of the journal, *Aquatic Botany*. *Dr. J. J. Ewel* has been promoted from Associated Professor to Professor of Botany. *Dr. Robert J. Ferl* has been joined this year by *Dr. William J. Lauglinier*, Associate Professor and Chairman of the Department of Biology at Hiram College, to conduct collaborative research on the molecular genetics of maize. *Dr. Walter S. Judd* has been selected as the recipient of the 1982 Jesse M. Greenman Award, Missouri Botanical Garden, for his contribution entitled "A monograph of *Lyonia* (Ericaceae)." *Dr. James W. Kimbrough* has been invited to present a keynote paper at the International Plant Pathology Congress in Melbourne, Australia, in 1983. *Dr. Francis E. Putz*, a tropical plant ecologist, joined the department in January 1982. *Dr. Indra K. Vasil* has recently been appointed Editor-in-Chief for a series of volumes on "Cell Culture and Somatic Cell Genetics in Plants", to be published by Academic Press. *Dr. Norris H. Williams* has been assigned general supervision of a gas chromatography/mass spectrometry labora-

tory recently set up by the Florida State Museum. The laboratory is mainly for work with secondary plant products, primarily terpenoids, aromatics, and general hydrocarbons.

Archbold Biological Station, Lake Placid. *Dr. Mark Deyrup* (Ph.D., University of Washington) and *Dr. Ronald L. Myers* (Ph.D., University of Florida) have been appointed Assistant Research Biologists. Dr. Deyrup, whose specialty is insect communities of dead wood, will conduct research on the ecology, distribution, and taxonomy of invertebrates of the Station, and serve as curator of the invertebrate reference collection. Dr. Myers, a plant ecologist with interests in community-level processes, will conduct vegetation studies and curate the Station herbarium.

Georgia

Savannah State College, Department of Biology and Life Sciences. *Dr. C. Obi Emeh*, Director of the Minority Biomedical Research Support Program, was promoted to Professor of Biology. The Marine Biology B.S. degree program approved by the Board of Regents, now has two full-time faculty, two boats, and a unique curriculum. Located directly adjacent to a saltmarsh waterway, the campus location offers the opportunity for classes to be conducted in natural laboratories. *Dr. Matthew R. Gilligan*, Coordinator of the program, offers a five-week summer course including a trip to the Bahamas where he instructs in his specialties of reef-fish ecology and underwater photography. *Dr. Joseph P. Richardson* specializes in marine benthic ecology and algal ecology and teaches an introductory Marine Science Summer course.

Georgia Southern College, Department of Biology. *Sturgis McKeever*, *Frank E. French*, and *Daniel V. Hagan*, recently attended the NEC-26 Annual Biting Fly Workshop in Lenox, MA, where McKeever reported on his research into the biology of Corithrellids, French reported on his Tabanid research, and Hagan reported on his Ceratopogonid research. Georgia Southern College will host the International Hematophagous workshop in 1983.

Louisiana

University of Southwestern Louisiana, Department of Biology. *Dr. JoAnn White* will spend the 1982-83 academic year as Visiting Associate Professor of Biology. Dr. White teaches at the University of North Carolina, and her research interests are the periodical cicadas in the Eastern United States. *Dr. Keith Roberts* has accepted a position as Assistant Professor. He received his Ph.D. from Miami University, OH. *Dr. John Sternfeld* has accepted a position as Assistant Professor. He earned the Ph.D. from Princeton University, and has been a Research Associate in the Dept. of Molecular Biology, Albert Einstein College of Medicine, since then. *John H. Blackson* has assumed the position of Electron Microscopy Laboratory Manager. The Louisiana Board of Regents has approved a doctoral program in Environmental and Evolutionary Biology. Students will be admitted into the program beginning with the 1983 fall semester. For further information write to: Graduate Coordinator, Department of Biology, Box 42451, USL, Lafayette, LA 70504.

Mississippi

Gulf Coast Research Laboratory, Ocean Springs. *Max Flandorfer*, Program Manager for the Mississippi-Alabama Sea Grant Consortium will serve as an instructor for a cooperative University of Miami/MASGC oceanography course. *Dr. Edwin Cake*, head of the oyster biology section, was installed as vice-president of the National Shellfisheries Association. A research building on the campus has been named in honor of William M. Shoemaker of Meridian, and the new Marine Education Center structure on the Biloxi campus has been named for J. L. Scott of Jackson. On September 14-17, the Laboratory hosted a Food and Drug Administration-sponsored training course entitled "The Sanitary Control of Molluscan Shellfish." The course was attended by sanitarians from the five Gulf states, plus Georgia and Maryland. *William Demoran*, *David Cook*, and *Allison Perry* assisted FDA personnel in teaching the course.

North Carolina

University of North Carolina at Wilmington, Department of Biological Sciences. *Dr. Lawrence Cahoon* has been appointed Assistant Professor. His specialty is Marine Plankton. *Dr. Harold Keller*

has been appointed Associate Professor and Chief Research Officer of the University. *Dr. Charles Fugler* has returned from Bangladesh where he worked under the auspices of the United Nations.

University of North Carolina at Chapel Hill, Department of Biology. The Department of Botany and the Department of Zoology were merged on July 1, 1982, forming a new Department of Biology. This makes the new department one of the largest on campus, with 37 full faculty members, 84 graduate students, and 805 undergraduate majors. University Distinguished Professor *Lindsay S. Olive* retired May 31, 1982, after being a member of the Department of Botany for 14½ years.

Highlands Biological Station, Highlands. The Biological Station will support meritorious research in ecology, systematics, and other field-oriented areas pertaining to the biota of the southern Appalachians through its grant-in-aid program. Awards are available at both the pre- and post-doctoral level in 1983. Preference in making awards will be given to projects requiring residency at the Station. The Station may also award one or more Thelma Howell Scholarship to support research of exceptional promise. These awards are provided by the Highlands Biological Foundation, Inc. in memory of Thelma Howell, who served for many years as Director of the Station. Applications for financial support in 1983 should be submitted no later than March 1. Write to: Director, Highlands Biological Station, P.O. Box 580, Highlands, N.C. 28741. There will be two special courses offered in 1983: (1) "Salamanders of the Southern Appalachians," taught by *Dr. Stephen G. Tilley* of Smith College, June 6–July 8 and (2) "Fleshy Fungi of the Southern Appalachians," taught by *Dr. Ronald H. Petersen* of the University of Tennessee, July 11–August 12. Each course is offered at the advanced undergraduate–graduate level and carries 6 semester hours credit.

North Carolina State University, Department of Zoology. *Dr. William W. Hassler* has retired from his position as Professor of Zoology and is continuing his active research program in fisheries and aquaculture as a Professor Emeritus. *Dr. Larry B. Crowder* has been appointed an Assistant Professor of Zoology, and will initiate a teaching and research program in fisheries.

Duke University, Department of Botany. *Lewis E. Anderson*, Professor of Botany, attained emeritus status at the end of August 1982. A symposium on "Contemporary Problems in Plant Anatomy," Durham, North Carolina, February 28–March 3, 1983, funded by NSF, will be directed by *Professor Richard A. White* (Duke University) and *Professor William C. Dickison* (The University of North Carolina, Chapel Hill). Open to the public; registration \$5.00. Contact either of the above.

Western Carolina University, Department of Biology. *Dr. Frederick W. Harrison* was elected Secretary of the American Microscopical Society. *Dr. James W. Wallace* was elected Chairman of the Southeastern Section of the Botanical Society of America, and as the Editorial Representative for the Phytochemical Section of the Botanical Society of America. *Drs. Richard C. Bruce, J. Dan Pittillo*, and *James H. Horton* hosted visiting botanists from the USSR during September. In addition, WCU has established a faculty exchange program with Yunnan University, Kunming, Yunnan Province, Peoples Republic of China. *Drs. Frederick W. Harrison* and *Richard C. Bruce* will be lecturing at Yunnan University during January and February, 1983.

South Carolina

The College of Charleston, Biology Department. *Dr. Martha W. Runey* has been appointed to the Advisory Council for the International Center for Public Health Research. *Dr. Susan J. Morrison* was appointed editor of *The Objective*, which is the newsletter of South Carolina branch of ASM. *Drs. C. K. (Chip) Biernbaum* and *Julian R. Harrison* are consultants to the staff of the Santee National Wildlife Refuge in their inventory of its four administrative areas. *Dr. Phillip Dustan* spent the summer of 1982 onboard the R/V Calypso studying the "biological oceanography" of the Amazon River from Belem, Brazil, to Iquitos, Peru, in conjunction with the Cousteau Society's Amazon Expedition.

Francis Marion College, Biology Department. *Dr. Laurence F. Swails* is the new Chairman of the Biology Department. *Dr. John S. Boyce* retired from the position. *Dr. Swails* received his Ph.D. at the University of Cincinnati, and has been a member of the faculty for 14 years.

Tennessee

Middle Tennessee State University, Department of Biology. The department has recently acquired an ISI SX-30 scanning electron microscope with a Robinson Backscatter detector. *Dr. Marion R. Wells* was elected a fellow in the Tennessee Academy of Science, November 1981.

Oak Ridge National Laboratory, Oak Ridge. A new book, entitled *Histological Atlas of the Laboratory Mouse*, has been written by *William D. Gude*, Biology Division, *Gerald E. Cosgrove*, San

Diego Zoological Society, and *Gerald P. Hirsch*, Veterans Hospital, Los Angeles. See the review in this issue of the ASB Bulletin.

East Tennessee State University, Department of Biological Science. East Tennessee State University Press has published the *Proceedings of the Third International Symposium on the Tardigrada, August 3-6, 1980, Johnson City, Tennessee*. This volume, containing papers presented at the symposium, provides comprehensive reviews on tardigrade biology as well as contemporary investigations in ultrastructure, cytology, species diversity, molting, and interdisciplinary studies. To order copies, contact Dr. Diane R. Nelson, Box 22900A, ETSU, Johnson City, TN 37614-0002.

Tennessee Technological University, Department of Biology. *Gordon Bennett Pennebaker*, Dean Emeritus of the College of Arts and Sciences, died at the Veterans Administration Hospital, Nashville, TN, 11 August 1982 following a long illness. During his career, Dr. Pennebaker distinguished himself as an inspiring classroom instructor, an able academic administrator, and a dedicated civic and religious leader. In appreciation of his many contributions to TTU, the Biology-Agriculture building was named Pennebaker Hall in 1971. He received his Ph.D. in Genetics from the University of Wisconsin in 1938. His career, spanning some forty-three years, included postdoctoral work at Columbia University, high school administration, faculty positions at Murray State University, Morehead State University, and Tennessee Technological University, where he served as Professor and Head of the Department of Biology, and later became the University's first Dean of Arts and Sciences. Dr. Pennebaker was a member of many professional organizations and a deacon of the First Baptist Church in Cookeville.

The University of Tennessee, Knoxville, Botany Department. *Dr. H. R. DeSelm* will work with the National Park Service to examine potential National Natural Landmarks in Middle Tennessee and to develop a classification of the vegetation of the Interior Low Plateaus. *Dr. Donald K. Dougall*, formerly with the W. Alton Jones Cell Science Center at Lake Placid, NY, has joined the faculty as Research Professor. Dr. Dougall's research area is plant cell and tissue culture. *Dr. Edward E. Schilling* received the 1982 Ralph E. Alston Award for the most outstanding paper presented at the Phytochemical Section meeting of the Botanical Society of America.

Virginia

Virginia Polytechnic Institute and State University, Department of Biology. *Dr. Ernest F. Benfield*, Associate Professor of Zoology has been appointed to the Board of Associate Editors of the *American Midland Naturalist*. He will serve as Associate Editor for Limnology and Hydrobiology.

Old Dominion University, Department of Biological Sciences. Several new faculty have been added to the department: *Dr. Alan Savitzky* (University of Kansas), herpetology; *Dr. Fred Singleton* (Texas A&M), marine microbiology; *Dr. Jacob Mayer* (Johns Hopkins), developmental biology; *Dr. Samuel Bieher* (N.Y. University), developmental biology; and *Dr. Rebecca Bray* (University of Alabama), plant systematics.

Bridgewater College, Biology Department. *Dr. L. Michael Hill* has been appointed Chairman of the department. Dr. Hill is a botanist with interests in the karyology of *Aster* (Asteraceae), *Sisyrinchium* (Iridaceae), and the flora of Virginia. He is succeeding *Dr. William L. Mengebier*, who received the ASB Meritorius Teaching Award for 1970. Dr. Mengebier continues to teach as a full-time Professor in the department.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

Fairchild Tropical Garden. *Drs. Donovan S. and Helen B. Correll* have completed the work on their book, *The Flora of the Bahama Archipelago*, which is now being printed by J. Cramer, Publ. and which should be available this fall or winter. *Dr. Roger W. Sanders* joined the staff as Assistant Taxonomist. His interests include the systematics of *Lantana*, cladistics, and biogeography. *Dr. Richard Mueller*, who has served as postdoctoral Research Associate in morphology since November, 1981, has obtained a permanent position as plant anatomist at Utah State University. *Dr. Michel Monnier*, Paris, France, worked in the tissue culture lab of *Dr. Knut Norstog* this past summer. Supported by a NATO grant, they are collaborating to develop techniques for obtaining tissue cultures of cycads from embryos.

The Marie Selby Botanical Gardens. *Dr. Russell J. Seibert*, curator of tropical horticulture, has received the Award of Merit from the American Association of Botanical Gardens and Arboreta, for his many significant contributions to horticulture. Before joining the staff, Dr. Seibert was, for 25 years, director of Longwood Gardens at Kennett Square outside Philadelphia. At Selby Gardens, he is in charge of the Tropical Food Demonstration Garden. The Smithsonian Institution's *Paul Desantels* arrived in Sarasota this week to receive a \$1700 lady-slipper orchid at the Marie Selby Botanical Gardens. The rare plant, a *Phragmipedium besseae*, is one of three sold at the annual Orchid Auction last spring. Highest bidders for two of them were Stewarts Orchids of Los Angeles and J.&L Orchids of Easton, CT. The recipient of the third remained, until now, the best kept secret in the annals of botany: consequently the plant has become known as "the mystery orchid." Anonymity was necessary because the orchid, a new species discovered by Libby Besse in Peru last year, was to be a surprise gift at a Rochester, NY, roast for Desantels, on the occasion of his retirement on July 30 as the Smithsonian's curator of gems and minerals.

South Carolina

Brookgreen Gardens, Murrells Inlet. On June 7, 1982, construction began on an Interpretive Center. This long-awaited facility provides a space for audio-visual presentations, orientations, lecture series, performing arts presentations, and many other uses.

ANNOUNCING MOUNTAIN LAKE BIOLOGICAL STATION SUMMER COURSES 1983

First Term (June 13-July 16)

Biology of Birds

David W. Johnston, George Mason University

Invertebrate Life: Pattern and Diversity

James L. Gooch, Juniata College

Population Biology of Plants

Janis Antonovics, Duke University

Taxonomy of Vascular Plants

James W. Hardin, North Carolina State University

Techniques & Materials for Scientific Illustration

Está L. Johnston, George Mason University

Second Term (July 18-August 20)

Animal Behavior

Steven P. Martindale, University of Virginia

Ecological Genetics

David A. West, Virginia Polytechnic Institute & State University

Field Botany of the Southern Appalachians

Charles R. Werth, Indiana University

Insect Ecology

Earl D. McCoy, University of South Florida

Vertebrates of the Southern Appalachians

Arthur J. Bulger, University of Virginia; *Joseph Travis*, Florida State University; and *Jerry O. Wolff*, University of Virginia

Workshop in Allozyme Techniques

Charles R. Werth, Indiana University

Scholarships Available: Service Awards for students covering room and board costs. Post-doctoral Research Awards (10 weeks)

For further information

and application write to: Dr. J. J. Murray, Jr., Director
Mountain Lake Biological Station
Gilmer Hall
University of Virginia
Charlottesville, VA 22901

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July 1981

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COVER

SEM (ca. 1700×) of the ascomycete fungus *Laboulbenia formicarum* Thaxter which is an obligate ectoparasite on ants of the subfamily Formicinae. Structures seen: short male thallus (foreground), tall female thallus (right background), and large ascus (center) of the fungus; imbricate exoskeleton and two setae of the ant. *Courtesy of Dr. C. Gerald Van Dyke, Dept. of Botany, N.C. State University.*

TIME AND PLACE OF FUTURE MEETINGS

1984	April 11–14	Memphis State University
1985		Middle Tennessee State University, Murfreesboro
1987		University of Georgia, Athens (50th Anniversary)

PATRON MEMBERS

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Parco Scientific Company, Vienna, OH
Beckman Instruments, Incorporated, Norcross, GA
Martin Instrument Company, Greenville, SC



*Program of the 44th Annual
Meeting of the
Association of Southeastern
Biologists*

*The University of Southwestern Louisiana, Lafayette
Conference Center
(318) 233-9350*

SOCIETIES MEETING WITH ASB IN LAFAYETTE

**Beta Beta Beta, Southeastern Region
Botanical Society of America, Southeastern Section
Ecological Society of America, Southeastern Chapter
Southeastern Society of Parasitologists
Southern Appalachian Botanical Club
Crustacean Society**

GENERAL INFORMATION

Registration and Information—Registration for the ASB meeting, purchase of meal tickets, and registration for field trips is arranged through PRE-REGISTRATION. Those who have pre-registered may obtain their information and ticket packet in the USL Conference Center lobby on Wednesday (5 P.M.–9 P.M.) and on Thursday and Friday (8 A.M.–5 P.M.). Late registration is available at these times. Fees: \$5.00, students; \$10.00, regular.

Parking—Those persons lodged in the Conference Center have the right to park in the lot behind the Conference Center, but they are not guaranteed a parking space there. There is no other on-campus parking for ASB except for the visitors' lot behind the Student Union. This lot usually fills early in the day. Abundant parking space is available at two locations some distance from the campus. The closest of these is the Municipal Auditorium on South College Road. From this lot to the Conference Center is a 15 minute walk. The route to follow is indicated by the dotted arrows on the campus map; most of the route leads through Girard Park. You are advised *not* to walk along the edge of Girard Park Drive because there are no sidewalks and the traffic is heavy and fast. The other alternative for parking is in the student lot at Cajun Field (accessed from Congress Street). Park on the eastern side of the stadium and board a USL bus for the shuttle to campus; the bus will stop on Rex Street a few yards from the Conference Center. The return bus from campus to Cajun Field leaves from the same point. The disad-

vantage of parking at Cajun Field is that *the shuttle buses do not operate after 5 P.M.*, and the walk is considerable.

Tickets for Scheduled Meals—Pre-registrants will receive the requested meal tickets in their registration packets. A limited number of tickets will be available for those who failed to pre-register.

Southeastern Chapter of the Ecological Society of America: Thursday Luncheon, \$8.00.

Southeastern Society of Parasitologists: Thursday Luncheon, \$8.00.

Southern Appalachian Botanical Club and Southeastern Section, Botanical Society of America: Friday Morning Breakfast, \$5.00.

Beta Beta Beta: Friday Luncheon, \$6.00.

Crustacean Society: Friday Luncheon, \$10.50.

ASB Banquet: Friday Evening, regular \$10.00; students \$8.00.

Placement Service—A table and bulletin board is available in the Conference Center lobby for institutions announcing open positions and for individuals seeking employment.

Dining and Lounge Facilities—A list of restaurants and their locations is furnished in the registration packet. Fast food restaurants near the Conference Center are indicated on the map in this issue. Other alternatives for a quick lunch are the Cafe de Lafayette on the second floor of the Student Union. Piccadilly Cafeteria on Coolidge Street, and Comeaux's two blocks across University Avenue from campus. If you want to try boudin for lunch at Comeaux's, about one pound is the standard amount to order. A list indicating the characters of some local lounges will be included in the registration packet.

Field Trips—For the current status of any trip, check at the registration desk in the Conference Center lobby.

Wednesday:

1. Crawfish Industry Tour, 1 P.M.–6 P.M. (Mr. Don Gooch, leader).

Saturday:

1. Fearman Bayou and Coastal Estuary, 8 A.M.–5:30 P.M.
2. Atchafalaya Basin Canoe Trip, 7 A.M.–6 P.M.
3. Weeks and Avery Island Botanical Trip, 7:30 A.M.–6 P.M. (Mr. Garrie Landry and Dr. Shirley Tucker, leaders).

Points of Interest in and near Lafayette—

1. Lafayette Natural History Museum and Planetarium; Wednesday and Friday, 8 A.M.–5 P.M.; Thursday, 8 A.M.–9 P.M.; Saturday, 1–5 P.M.
2. Lafayette Museum; Tuesday through Saturday, 9 A.M.–noon and 2–5 P.M.
3. Art Center for Southwestern Louisiana; Monday–Friday, 9:30 A.M.–4:30 P.M.
4. Acadian Village and Tropical Gardens; 10 A.M.–5 P.M.; 981-2364.
5. Evangeline Downs; 896-6185.
6. Shadows-on-the-Teche in New Iberia; 9 A.M.–4:30 P.M.; 369-6446.

Useful Phone Numbers (Area Code 318)—

USL Conference Center 233-9350
USL Department of Biology 231-6748
USL Police 231-6447
Acadian Ambulance Service 261-1511
Guy's Towing Service 237-4897
Lafayette General Hospital 261-7991

Local Arrangements Committee—

Chairman—Dr. James F. Jackson (231-6756)
Program—Dr. Victoria I. Sullivan (231-6987)
Pre-Registration and Registration—Dr. Robert G. Jaeger (231-5235)
Audio-Visual—Ms. Karen J. Fritze (231-5236)
Exhibits—Dr. Pegge L. Alciatore (231-5705)
Field Trips—Dr. Darryl L. Felder (231-6753) and Mr. Garrie Landry (231-5706)
Parking and Transportation—Dr. Matt E. Dakin (231-6752)
Special Events—Dr. Mark A. Konikoff (231-6754)
Lodging Reservations—USL Conference Center (233-9350)

Notes

Program Summary

WEDNESDAY, APRIL 13, 1983

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| 1:00 P.M.–6:00 P.M. | Field Trip: Crawfish Industry Tour; Conference Center Lobby. |
| 5:00 P.M.–9:00 P.M. | Pick up registration packets by pre-registrants; Late registration, Conference Center Lobby. |
| 7:30 P.M. | ASB Executive Committee Meeting: Conference Center, Room 421. |

THURSDAY, APRIL 14, 1983

GENERAL SESSION: ANGELLE HALL AUDITORIUM

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| 8:00 A.M.–9:30 A.M. | Address of Welcome: <i>Dr. Sammie Cosper</i> , Vice-President for Academic Affairs, University of Southwestern Louisiana. Response: <i>Dr. Margaret L. Gilbert</i> , ASB President, Florida Southern College. Featured Address: Cell Differentiation in <i>Volvox</i> , <i>Dr. Richard C. Starr</i> , Ashbel Smith Professor of Botany, University of Texas at Austin. |
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Registration, Information, and Paper Sessions

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| 8:00 A.M.–5:00 P.M. | Late Registration and Information, Conference Center Lobby |
| 8:00 A.M.–5:00 P.M. | Banquet and Field Trip Reservations, Conference Center Lobby |
| 8:00 A.M.–5:00 P.M. | Exhibits, Conference Center Lobby |
| 8:00 A.M.–5:00 P.M. | Placement Service, Conference Center Lobby |

Paper Sessions (no smoking)

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| 9:50 A.M.–noon | Symposium: Selected Wetland Conservation Issues in the Southeast, Room 174. |
| 9:40 A.M.–11:45 A.M. | Special Session: Origins and Distributions of Caribbean–Gulf of Mexico Crustacean Fauna. I, Room 171 |
| 10:00 A.M.–11:44 A.M. | Plant Systematics, Session I, Room 172 |
| 10:00 A.M.–11:18 A.M. | Plant Ecology, Session I, Room 173 |
| 10:00 A.M.–11:18 A.M. | Physiology, Session I, Spanish Room |
| 10:00 A.M.–11:05 A.M. | Cell and Molecular Biology, Session I, Room 389 |
| 10:00 A.M.–11:44 A.M. | Parasitology, Session I, Greek Room |

Business and Luncheon Meetings

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| noon–2:15 P.M. | Southeastern Society of Parasitologists. Featured Address: A Physiological Approach in Characterizing the Mechanism of Immunity in Trichinosis , <i>Dr. Gilbert A. Castro</i> , University of Texas Health Science Center at Houston, Room 153. |
| 11:30 A.M.–1:20 P.M. | Southeastern Chapter of the Ecological Society of America. Luncheon with a speaker, Room 151. |

Paper Sessions (no smoking)

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| 2:00 P.M.–4:45 P.M. | Symposium: Wetland Ecosystems of the Southeast. I, Room 174 |
| 1:30 P.M.–4:32 P.M. | Special Session: Origins and Distributions of Caribbean–Gulf of Mexico Crustacean Fauna. II, Room 171 |
| 1:30 P.M.–4:06 P.M. | Plant Systematics, Session II, Room 172 |
| 1:30 P.M.–4:19 P.M. | Plant Ecology, Session II, Room 173 |

1:30 P.M.—4:19 P.M.	Ichthyology and Herpetology, Session I, Spanish Room
1:30 P.M.—3:01 P.M.	Cytology, Genetics, and Developmental Biology, Session I, Room 389.
2:30 P.M.—4:14 P.M.	Parasitology, Session II, Greek Room

Hospitality Session

8:00 P.M.—11:00 P.M.	Board Room, Conference Center: Cash Bar
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FRIDAY, APRIL 15, 1983

7:30 A.M.—9:00 A.M.	Business and Breakfast Meeting, Southern Appalachian Botanical Club and Southeastern Section Botanical Society of America, Room 151
8:00 A.M.	Past Presidents' Breakfast, Room 153
8:00 A.M.—5:00 P.M.	Late Registration and Information, Conference Center Lobby
8:00 A.M.—noon	Exhibits, Conference Center Lobby
8:00 A.M.—5:00 P.M.	Placement Service, Conference Center Lobby

Paper Sessions (no smoking)

8:00 A.M.—10:45 A.M.	Symposium: Wetland Ecosystems of the Southeast. II, Room 174
8:06 A.M.—10:54 A.M.	Special Session: Origins and Distributions of Caribbean–Gulf of Mexico Crustacean Fauna. III, Room 171
9:15 A.M.—10:46 A.M.	Plant Systematics, Session III, Room 172
9:15 A.M.—10:33 A.M.	Animal Ecology, Session I, Room 173
8:30 A.M.—10:53 A.M.	Ichthyology and Herpetology, Session II, Spanish Room
9:15 A.M.—10:59 A.M.	Cytology, Genetics, and Developmental Biology, Session II, Room 389
9:15 A.M.—10:33 A.M.	Parasitology, Session III, Greek Room

Business and Luncheon Meetings

11:00 A.M.—noon	ASB Annual Business Meeting, Room 174
noon	Luncheon and Business Meeting, Beta Beta Beta, Room 151
noon—1:20 P.M.	Luncheon and Informal Meeting, Crustacean Society, Room 153

Paper Sessions (no smoking)

1:30 P.M.—4:19 P.M.	Aquatic Ecology, Session I, Room 174
1:30 P.M.—2:48 P.M.	Animal Ecology, Session II, Room 171
1:30 P.M.—3:53 P.M.	Plant Systematics, Session IV, Room 172
1:30 P.M.—4:06 P.M.	Plant Ecology, Session III, Room 173
1:30 P.M.—3:53 P.M.	Cryptogamic Botany, Session I, Spanish Room
1:30 P.M.—4:06 P.M.	Invertebrate Zoology, Session I, Greek Room
1:30 P.M.—5:00 P.M.	Beta Beta Beta National Honorary Biological Society—District I, Room 220, Billeaud Hall; District II, Room 221, Billeaud Hall

ASB Banquet

8:00 P.M.	ASB Banquet
	Presentation of Awards
	Past President's Address: A Missing Link , <i>Dr. J. Frank McCormick</i> , Conference Center Lobby

SATURDAY, APRIL 16, 1983

7:00 A.M.	Atchafalaya Basin Canoe Trip
7:30 A.M.	Weeks and Avery Island Botanical Trip
8:00 A.M.	Fearman Bayou and Coastal Estuary Cruise
	Field trips originate either in front of the Conference Center or nearby in the parking lot behind Dupre Library.
8:30 A.M.	ASB Executive Committee Breakfast and Meeting, Greek Room

Notes

The Thursday Morning General Session

Cell Differentiation in *Volvox*

The speaker for the 1983 general session is Dr. Richard C. Starr, Ashbel Smith Professor of Botany at the University of Texas at Austin.



Dr. Starr's honors include: membership in the National Academy of Sciences; corresponding membership in Akademie der Wissenschaften zu Göttingen; Merit Award, Botanical Society of America; and a Guggenheim Fellowship. He has held offices in the International Phycological Society, Phycological Society of America, Botanical Society of America, and the American Institute of Biological Sciences. Dr. Starr has served on the editorial board of *Archiv für Protistenkunde*, *Journal of Phycology*, and *Phycologia*. He edits the section on algae for *Biological Abstracts*.

Dr. Starr has published more than fifty scientific papers, most dealing with reproduction and cell differentiation in algae. He recently authored the chapter on colonial chlorophytes in the book, *Phytoflagellates*. Concomitant with his research on green algae, Dr. Starr has invested great effort developing one of the world's largest culture collections of algae. It is now housed at the University of Texas and is used by researchers around the world.

Dr. Starr's background promises an interesting address in an exciting field. This presentation is co-sponsored by ASB and the Southeastern Section of the Botanical Society of America.

ASB Symposia and Special Sessions

All Symposia and the Special Session Meet in the USL Conference Center

The symposia entitled "Selected Wetland Conservation Issues of the Southeast" is sponsored by the ASB Conservation Committee and organized by *Dr. Douglas A. Raynor*, South Carolina Wildlife and Marine Resources Department. The symposium entitled "Wetland Ecosystems of the Southeast" is co-sponsored by the Southeastern Chapter of the Ecological Society of America and the Association of Southeastern Biologists and organized by *Dr. Armanda de la Cruz*, Mississippi State University. The special session entitled "Origins and Distributions of Caribbean-Gulf of Mexico Crustacean Fauna" is co-sponsored by The Crustacean Society and the Association of Southeastern Biologists and organized by *Dr. Darryl L. Felder*, University of Southwestern Louisiana.

Symposium I

SELECTED WETLAND CONSERVATION ISSUES IN THE SOUTHEAST,

THURSDAY MORNING

Room 174

Presiding: *Dr. Douglas A. Raynor*, South Carolina Wildlife and Marine Resources Department.

- 9:50 Introduction: Douglas A. Raynor, South Carolina Wildlife and Marine Resources Department.
- 10:00 1. Wetlands in Coastal Louisiana's Future: Sherwood Gagliano, Coastal Environment, Inc. and Gene Turner, Louisiana Center for Wetland Resources.
- 10:30 2. Wetland Conservation Issues in Florida: Ane Merriam, Florida State University.
- 11:00 3. Pitcher Plant Bogs in the Coastal Plain: George Folkerts, Auburn University.
- 11:30 4. Carolina Bays, A Southeastern Ecosystem in Need of Research and Conservation: Julie Moore, North Carolina Natural Heritage Program.

Symposium II

WETLAND ECOSYSTEMS OF THE SOUTHEAST

SESSION I—BIOTA AND ENVIRONMENT

THURSDAY AFTERNOON

Room 174

Presiding: *Dr. Armando A. de la Cruz*, Mississippi State University.

- 2:00 Convenor's Introduction.
- 2:05 5. *Spartina* Marshes of the Mississippi River and Deltaic Plain: James G. Gosselink, Louisiana State University.
- 2:35 6. *Juncus roemerianus* Marshes of the North Central Gulf Coast: Judy P. Stout, University of South Alabama and Dauphin Island Sea Lab.
- 3:05 7. Cypress Swamps of the Southeastern United States: William J. Mitsch, University of Louisville.

- 3:35 8. Mangrove Forests of the Southeastern United States: Roy R. Lewis, III, Hillsborough Community College and Mangrove Ecosystems, Inc.
- 4:05 9. Bottomland Hardwood Forests of the Southeast: Charles Wharton, University of Georgia Institute of Ecology.
- 4:35 Summary: Armando A. de la Cruz.

SESSION II—THE ATCHAFALAYA BAY-BASIN SYSTEM

FRIDAY MORNING

Room 174

Presiding: *Dr. John Day*, Louisiana State University, Center for Wetland Resources.

- 8:00 Convenor's Introduction, John Day.
- 8:05 10. Physical Processes: Primary Determinant for Biological Interactions in the Atchafalaya Delta Ecosystem: Rodney Adams, Louisiana State University, Center for Wetland Resources.
- 8:35 11. Nutrient Dynamics in the Atchafalaya-Fourleague Bay Ecosystem: John Day, Christopher Madden, and Jane Caffrey, Louisiana State University, Center for Wetland Resources.
- 9:05 12. Atchafalaya Delta Vegetation, Establishment and Development: C. E. Sasser, W. B. Johnson, and J. G. Gosselink, Louisiana State University, Center for Wetland Resources.
- 9:35 13. Benthic Infauna of the Atchafalaya Delta, Pioneers or Survivors? W. B. Sikora and J. P. Sikora, Louisiana State University, Center for Wetland Resources.
- 10:05 14. The Atchafalaya Delta Fish Fauna, Estuarine Sense and Nonsense: Bruce Thompson and Linda A. Deegan, Louisiana State University, Center for Wetland Resources.
- 10:35 Summary: John Day.

Special Sessions

ORIGINS AND DISTRIBUTIONS OF CARIBBEAN-GULF OF MEXICO CRUSTACEAN FAUNA

THURSDAY MORNING

Room 171

Presiding: *Dr. Raymond B. Manning*, Smithsonian Institution

- 9:40 Convenor's Remarks: Dr. Raymond B. Manning
- 9:42 Welcome and Opening Comments: Dr. Darryl L. Felder, University of Southwestern Louisiana
- 9:45 15. Distributions and Zoogeographic Affinities of Stomatopod Crustaceans of the Gulf of Mexico: David K. Camp, Marine Research Laboratory, Florida Department of Natural Resources.
- 10:03 16. Zoogeography of the *Heteromysis* (Mysidacea) in the Caribbean Sea and Gulf of Mexico: Richard F. Modlin, The University of Alabama in Huntsville.
- 10:21 17. Zoogeography and Origin of Stenopodidean Shrimps in the Caribbean and Gulf of Mexico: Joseph W. Goy, University of Southwestern Louisiana.
- 10:39 BREAK

- 10:54 18. The Recent Cirriped Fauna of the Gulf of Mexico: A Biogeographical Analysis: Henry R. Spivey, Florida State University.
- 11:12 19. Distribution Patterns of Tanaidacea in the Caribbean Sea and the Gulf of Mexico: Preliminary Results: Jürgen Sieg and R. W. Heard, Universität Osnabrück/Abteilung Vechta; Gulf Coast Research Laboratory/Ocean Springs.
- 11:30 20. Warm-Temperate to Tropical Transitions in Selected Decapod Assemblages of the Gulf of Mexico: Darryl L. Felder, University of Southwestern Louisiana.

THURSDAY AFTERNOON

Room 171

Presiding: *Dr. Lawrence G. Abele*, Florida State University

- 1:30 21. Zoogeographical Relationships of Decapod Crustacea in a Subtropical Transitional Zone, the Indian River Region of Florida: Robert H. Gore, Academy of Natural Sciences of Philadelphia.
- 1:54 22. The Origin and Distribution of the Amphipoda on the Submerged Banks of the Western Gulf of Mexico.: L. D. McKinney, Texas A&M University at Galveston.
- 2:07 23. Anomuran Porcellanid Crabs from Margarita and Cubagua Islands, Venezuela: Marcelo A. Scelzo, Escuela de Ciencias Aplicadas del Mar, Universidad de Oriente.
- 2:20 24. An Overview of the Shallow-Water Free-Living Marine Isopoda of Florida: Sara-Ann F. Treat, Mangrove Systems, Inc.
- 2:33 25. Decapod Crustaceans from Cay Sal Bank, Bahamas, with Notes on their Zoogeographic Affinities: Rafael Lemaitre, University of Miami, Rosenstiel School of Marine and Atmospheric Sciences.
- 2:46 BREAK
- 3:01 26. Larval Distribution of Porcellanid Crabs (Decapoda, Anomura) in the Northern Gulf of Mexico: Robert C. Maris, Old Dominion University.
- 3:14 27. Vertical Distribution of Sergistid Life-History Stages in Relation to Environmental Parameters: D. L. Penry, M. Vecchione, and C. L. Stubblefield, McNeese State University.
- 3:27 28. A Descriptive Model for Offshore Dispersal of Larval Blue Crabs (*Callinectes sapidus*) and Reinvasion into the Lower Chesapeake Bay, Virginia: J. R. McConaughy, R. C. Maris, D. F. Johnson, and A. J. Provenzano, Old Dominion University.
- 3:40 29. A Comparison of Larval and Post-Larval Development in the *Mordax*-group of *Uca* from the Northern Gulf of Mexico: Michael F. Flynn and Darryl L. Felder, University of Southwestern Louisiana.
- 3:53 30. Factors Affecting the Larval Development of the Freshwater Prawn *Macrobrachium heterochirus* Under Laboratory Conditions in Puerto Rico: Carlos A. Ching, University of Puerto Rico.
- 4:06 31. The Larval Development of *Arenaeus cribrarius* (Lamarck), under Laboratory Conditions: Kenneth C. Stuck, Gulf Coast Research Laboratory.
- 4:19 32. Ecological Behaviour of a Macrobenthic Community in Terminos Lagoon, Camp., Mexico: Elva Escobar-B. and Luis A. Soto, Instituto de Ciencias del Mar y Limnología, UNAM.

FRIDAY MORNING

Room 171

Presiding: *Dr. Frank M. Truesdale*, Louisiana State University

- 8:06 33. The Caves of Bermuda: Biogeographical Anomalies: C. W. Hart, Jr. and Raymond B. Manning, Smithsonian Institution; and T. M. Iliffe, Bermuda Biological Station.
- 8:19 34. Observations on the Distribution of Pelagic Peracarida in the Northern Gulf of Mexico: Kenneth C. Stuck, Gulf Coast Research Laboratory.

- 8:32 35. Observations on the Ampeliscidae (Gammaridea: Peracarida) Occurring in the Gulf of Mexico: G. D. Goeke and R. W. Heard, Gulf Coast Research Laboratory.
- 8:45 36. Distributional Patterns of the Decapod Crustacean Shelf-Fauna of the Northeastern Gulf of Mexico: Luis A. Soto, Instituto de Ciencias del Mar y Limnología, UNAM.
- 8:58 37. The Origin and Distribution of Species of Stone Crabs (genus *Menippe*) throughout the Southeastern United States: Evidence from Electrophoresis: Theresa M. Bert, Yale University.
- 9:16 38. Recovery of the Louisiana Shelf Crustacean Community Following Mass Mortality: Natural vs. Experimental Comparisons: Donald P. Weston, McNeese State University.
- 9:29 39. Biogeographical Ecology of Temperate and Tropical American Freshwater Decapod Crustaceans: Lawrence Abele and Bruce Felgenhauer, Florida State University.
- 9:47 BREAK
- 10:02 40. Factors Influencing the Distribution of *Uca subcylindrica*: Nancy N. Rabalais, University of Texas Marine Science Institute, Port Aransas Marine Laboratory.
- 10:15 41. Effects of Currents on the Distribution of Meiobenthic Copepods Across a Tidal Gradient: J. W. Fleeger, G. T. Chandler, G. R. Fitzhugh, and F. E. Phillips, Louisiana State University.
- 10:28 42. Population Dynamics of Three Sympatric Species of Snapping Shrimps; *Synalpheus brooksi*, *S. longicarpus*, and *S. pectiniger* as Sponge Commensals: Robert B. Erdman and Norman J. Blake, University of South Florida.
- 10:41 43. The Vertical Distribution of the Two Forms of *Panopeus herbstii* on Oyster Reefs in the N.E. Gulf of Mexico: Roger J. Menendez, Florida State University.

Notes

ASB Paper Sessions

THURSDAY MORNING, APRIL 14

Plant Systematics, Session I—Room 172

Presiding: *Dr. Roy C. Brown*, University of Southwestern Louisiana

- 10:00 44. Fusiak, Frank. (University of Tennessee). A Systematic Study of the *Prenanthes roanensis* Complex of the Southern Appalachians.
- 10:13 45. Coile, Nancy C. (University of Georgia). Flavonoids in *Ceanothus americanus* L. (Rhamnaceae).
- 10:26 46. Roberts, Marvin L. and Robert R. Haynes. (The University of Alabama). Chemosystematics of the Genus *Najas* (Najadaceae).
- 10:39 47. Fairey, John E., III, Robert E. Ballard, Shelby A. Hull, and Alston E. Hodge. (Clemson University). Flavonoid Study in the Genus *Scleria* Bergius Section *Scleria*.
- 10:52 48. McDougal, Karen M. and Clifford R. Parks. (University of North Carolina). Geographic Distribution of Flavonoid Chemotypes of Red Oak, *Quercus rubra* L.
- 11:05 49. Smith, Gerald L. (University of Georgia). An Infrageneric Classification for *Piptocarpha* R. Br.
- 11:18 50. Doyle, James. (University of North Carolina). Flavonoids and Isozymes of the *Opuntia humifusa* complex.
- 11:31 51. Watson, Frank D. (North Carolina State University). A Reconsideration of Cytological Evolution in the Pinales.

Plant Ecology, Session I—Room 173

Presiding: *Dr. Bruce Williamson*, Louisiana State University

- 10:00 52. Neufeld, Howard S. and Claude W. DePamphilis. (University of Georgia). Phenology and Seasonal Water Relations of *Aesculus sylvatica* Bartram, a Small Vernal Understory Tree.
- 10:13 53. Gyllenhaal-Davis, Charlotte. (University of Alabama). An Experimental Analysis of Agonomic and Ecological Factors Affecting Yields in Slash-and-Burn Agriculture.
- 10:26 54. Bozeman, John R., Wayne K. Webb, and George A. Rogers. (Georgia Department of Natural Resources, Union Camp Corporation, and Georgia Southern College). Recent Discoveries of *Elliottia racemosa* Muhl. ex Ell.: Seed Source for the Altamaha River Watershed, Georgia.
- 10:39 55. Dolan, Rebecca Wilcox. (University of Georgia and Savannah River Ecology Laboratory). Aspects of the Demography and Life History of *Ludwigia leptocarpa*.
- 10:52 56. Drapalik, Donald J. (Georgia Southern College). The Effects of Fire and Bedded Site Preparation on a Population of *Elliottia racemosa* Muhl. ex Ell. in Candler County, Georgia.
- 11:05 57. Mytinger, Linda. (Louisiana State University). *Schinus*—A Super-weed Strikes the Saline Communities of Everglades National Park.

Physiology, Session I—Spanish Room

Presiding: *Dr. Steven Hand*, University of Southwestern Louisiana

- 10:00 58. Hand, Steven C. and John F. Carpenter. (University of Southwestern Louisiana). On the Nature of pH-induced Activation of Metabolism during Cryptobiotic-Active Life Transitions.
- 10:13 59. Huey, David W. and Thomas L. Beitinger. (Louisiana State University at Alexandria and North Texas State University). MS-222 Induced Methemoglobinemia in Channel Catfish.

- 10:26 60. Howell-Major, Margaret and William Gordon. (Howard University). Effect of Gibberellic Acid (GA_3) on Cerato-Ulmin Production and Pathogenicity of *Ceratocystis ulmi* Isolates.
- 10:39 61. Stone, Benjamin P. (Austin Peay State University). 2-Deoxy-D-Glucose Reversal of IAA and GA Enhanced Plant Growth Responses.
- 10:52 62. Houck, Duane F. (Southern College). Hormonal Regulation of Epiphyllous Bud Release in *Bryophyllum calycinum*.
- 11:05 63. Niemeier, Sue E. and Robert A. Young. (Southern Illinois University). Comparison of Soluble Amino Acid Content in Five Populations of *Crotalaria sagittalis* L.

Cell and Molecular Biology, Session I—Room 389

Presiding: *Dr. Keith Roberts*, University of Southwestern Louisiana

- 10:00 64. Guobaitis, Richard and Michael Maddock. (College of Charleston). Activation of Promutagens by Multiple Forms of Cytochrome P-450 in Toadfish Microsomes.
- 10:13 65. Adkison, Linda R. and W. H. Kerr Anderson. (Tulane Medical School). Surface Antigen Variation Observed in Leukemia Patients Using Monoclonal Antibodies.
- 10:26 66. Ryals, Phillip E. and Harriett E. Smith. (University of Alabama). Enhancement of Heat-Shock Induced Morphological Transformation in *Tetrahymena vorax* by D-Alpha-Tocopheryl Succinate Type IV and Succinate.
- 10:39 67. O'Kelley, J. Charles. (The University of Alabama). Glutamine Synthetase and Sexual Expression in *Chlorococcum echinozygotum* Starr.
- 10:52 68. Grose, Teresa. (Western Carolina University). Phospholipid Participation in Lipidic Particles.

Parasitology, Session I—Greek Room

Presiding: *Dr. Sharon Patton*, University of Tennessee

- 10:00 69. Johnson, Sandra Strawbridge and Sharon Patton. (College of Veterinary Medicine, University of Tennessee). Serological Survey for Toxoplasma Antibodies in Raccoons of Cades Cove, Great Smoky Mountains National Park, Tennessee.
- 10:13 70. Kyle, Dennis E. and Gayle P. Noblet. (Clemson University). Isolation of Thermotolerant *Acanthamoeba* from South Carolina Piedmont Lakes.
- 10:26 71. Kogut, M. H. and P. L. Long. (University of Georgia). Extraintestinal Sporozoites of *Eimeria* of the Chicken.
- 10:39 72. Noblet, Gayle P. (Clemson University). Transfer of *Leucocytozoon smithi* Gametocytes from Infected to Uninfected Turkey Hosts.
- 10:52 73. Current, William L. and Patricia N. Campbell. (Auburn University). Serum Antibodies to *Cryptosporidium* in Humans with Confirmed Infections.
- 11:05 74. Haynes, T. B. and W. L. Current. (Auburn University). Completion of the Life Cycle of Human *Cryptosporidium* sp. in Cell Culture.
- 11:18 75. Lindsay, David S. and William L. Current. (Auburn University). The *In Ovo* Development of *Isospora suis*.
- 11:31 76. Upton, Steve J., William L. Current, John V. Ernst, and Susan M. Barnard. (Auburn University, USDA Animal Parasitology Institute, and Atlanta Zoological Park). *Caryospora simplex*: Extra-Intestinal Development in Mice.

THURSDAY AFTERNOON, APRIL 14

Plant Systematics, Session II—Room 172

Presiding: *Dr. Robert Haynes*, University of Alabama

- 1:30 77. Jacobs, Brian F., Charles R. Werth, and Sheldon I. Guttman. (Miami University). Genetic Relationships in *Abies* (fir) of the Eastern U.S.: an Electrophoretic Study.

- 1:43 78. Cantrell, G. J., Jr. (Vanderbilt University). The Mexican Endemic *Anreolaria greggii* (S. Wats.) Pennell and its Infrageneric Position.
- 1:56 79. Lucas, Bill and Dan K. Evans. (Marshall University). A Biosystematic Comparison Between *Polemonium reptans* L., *P. reptans* L. var. *villosum* Braun, and *P. Vanbruntiae* Britt. in the Eastern United States.
- 2:09 80. Davenport, L. J. (University of Alabama). A Monograph of *Hydrolea* (Hydrophyllaceae).
- 2:22 81. Wiersma, John H. (University of Alabama). A Numerical Taxonomic Assessment of *Nymphaea* Subgenus *Hydrocallis*.
- 2:35 82. Nesom, Guy L. (Memphis State University). Geographic Distribution Patterns Among Taxa of the Gerbera Group (Asteraceae).
- 2:48 83. Sullivan, Gene A. (Louisiana State University). The Biogeography of *Ladenbergia* Klotzsch.
- 3:01 BREAK
- 3:14 84. Comeaux, Barry. (North Carolina State University). Nomenclature of *Vitis cinerea* var. *floridana* Munson.
- 3:27 85. Cantrell, G. J., Jr. (Vanderbilt University). The Linnaean Genus *Gerardia* L. and Its Current Status.
- 3:40 86. Wolford, B. Eugene. (University of Tennessee). A New *Lindera* (Lauraceae) from North America.
- 3:53 87. Stritch, Lawrence R. and Robert H. Mohlenbrock. (Southern Illinois University). The Genus *Penstemon* in Illinois.

Plant Ecology, Session II—Room 173

Presiding: Dr. Meredith Blackwell, Louisiana State University

- 1:30 88. Williamson, G. Bruce. (Louisiana State University). Are Tropical Trees Clumped?
- 1:43 89. Mitchell, Claudia E. and George T. Weaver. (Southern Illinois University). Changes in Calcium Concentrations of Foliage and Twigs during Leaf Senescence of *Quercus prinus* L. in Southern Illinois.
- 1:56 90. Jones, John D. (Soil Conservation Service). Influence of Oaks on the Accumulation of Calcium in Forests.
- 2:09 91. Barker, Nancy G. (Louisiana State University). Effects of Fire on Pitcher Plants in Southeast Louisiana.
- 2:22 92. Smathers, Garrett A., Paul R. Saunders, and George S. Ramseur. (Western Carolina University, Washington State University, and University of the South). Soil Investigation of a Spruce-Fir Burn in the Plott Balsam Mountains, North Carolina.
- 2:35 93. Hackney, Courtney T. and Armando A. de la Cruz. (University of North Carolina at Wilmington and Mississippi State University). Effects of Winter Fire on the Productivity and Species Composition of Two Brackish Marsh Communities (1976–80).
- 2:48 94. Hook, Robert A., William H. Martin, and William H. Romme. (Eastern Kentucky University and Fort Lewis College). Analysis of Ground Layer Vegetation in and around Treefall Gaps at Lilley Cornett Woods.
- 3:01 BREAK
- 3:14 95. Ware, Stewart and Roland Monette. (College of William and Mary). Early Forest Succession in the Central Coastal Plain of Virginia.
- 3:27 96. Winstead, Joe E. (Western Kentucky University). Changes in a Climax Forest in South Central Kentucky after Ten Years (1972–82).
- 3:40 97. MacKenzie, Mark D. and Peter S. White. (Great Smoky Mountains National Park and University of Tennessee). Woody Vegetation of the Great Smoky Mountains Based on Data Collected in the 1930's.
- 3:53 98. Davidson, Jean L. (University of Tennessee). Lake in the Woods: Evidence of Mid-Holocene Landscape Change in Cades Cove, Great Smoky Mountains.
- 4:06 99. Stalter, Richard. (St. John's University). Is Hempstead Plains, Long Island, New York, a Stable Plant Community?

Ichthyology and Herpetology, Session I—Spanish Room

Presiding: *Dr. Mark A. Konikoff*, University of Southwestern Louisiana

- 1:30 100. Olson, Kenneth R., Kimberly B. Flint, and Richard Budde. (University Notre Dame and Oak Ridge Graduate School of Biomedical Sciences). Vascular Corrosion Replicas of Chemo-Baroreceptors in Fish: The Carotid Labyrinth in Ictaluridae and Clariidae.
- 1:43 101. Ditty, James G. and Robert J. Ganczak. (Louisiana Department of Wildlife and Fisheries). Spawning of Red Drum, *Sciaenops ocellatus*, and Spotted Sea Trout, *Cynoscion nebulosus*, along Coastal Louisiana.
- 1:56 102. Cicerello, Ronald R. and Robert S. Butler. (Kentucky Nature Preserves Commission and Eastern Kentucky University). The Fishes of Buck Creek, Upper Cumberland River System, Kentucky.
- 2:09 103. McBride, Steve and Donald Tarter. (Marshall University). Food Habits of the Sauger *Stizostedion canadense*, from the Gallipolis Locks and Dam, Ohio River Mile 279.
- 2:22 104. Sheridan, Mark and Donald Tarter. (Marshall University). Food Habits of the Freshwater Drum, *Aplodinotus grunniens*, from the Gallipolis Locks and Dam, Ohio River, Mile Point 279.
- 2:35 105. Timmons, Tom J. (Murray State University). Initial Changes in Fish Species Composition in Two New Lakes of the Tennessee–Tombigbee Waterway, Alabama–Mississippi.
- 2:48 BREAK
- 3:01 106. Mitchell, Sandra and Gary L. Miller. (Mississippi State University). Habitat Characteristics and Chorus Structure of the Green Treefrog (*Hyla cinerea*) in a Natural Pond.
- 3:14 107. Reagan, Nancy L. (Western Carolina University). Larval Life History of *Eurycea bislineata* in the Southern Appalachians.
- 3:27 108. Semlitsch, Raymond D. (Savannah River Ecology Laboratory). Burrowing Ability and Behavior of Salamanders of the Genus *Ambystoma*.
- 3:40 109. Pechmann, Joseph H. K., Raymond Semlitsch, and J. Whitfield Gibbons. (Savannah River Ecology Laboratory). The Drift Fence with Pitfall Traps: A Useful Technique for Studying Amphibian and Reptile Communities.
- 3:53 110. Ireland, Patrick H. (Radford University). Tagging Larval Salamanders.
- 4:06 111. Martin, David L. (University of Southwestern Louisiana). Combat Behavior in Snakes and the Sexual Rivalry Hypothesis.

Genetics, Cytology, and Developmental Biology, Session I—Room 389

Presiding: *Dr. Betty E. Lemmon*, University of Southwestern Louisiana

- 1:30 112. Boullion, Karen J. and Russell L. Chapman. (Louisiana State University). Preliminary Observations on Mithramycin-Stained *Trentepohlia aurea* (Chlorophyta) Grown in Various Light–Dark Regimes.
- 1:43 113. Ashley, Terry. (University of Tennessee). Reexamination of the Case for Homology Between the X and Y Chromosomes in Mouse and Man.
- 1:56 114. Dolan, Thomas E. (University of Georgia). Mitosis in *Monoblepharella* sp.
- 2:09 115. Freeman, John A. (University of South Alabama). Epidermal Evagination during Segment Morphogenesis in *Artemia*.
- 2:22 116. Sternfeld, John and Charles N. David. (University of Southwestern Louisiana and Zoologisches Institut, Munich). Fate and Regulation of Anterior-Like Cells in *Dictyostelium*.
- 2:35 117. Brown, Roy C. and Betty E. Lemmon. (University of Southwestern Louisiana). Microtubule Systems in Young Spores of the Moss *Tetraphis pellucida* Hedw.
- 2:48 118. Oyofe, Buhari A. and John E. Mayfield. (Atlanta University). Effect of Cyclic AMP Modulating Agents on Melanin and Conidation in *Verticillium dahliae*.

Parasitology, Session II—Greek Room

Presiding: *Dr. William Current*, Auburn University

- 2:30 119. Shoop, W. L. and K. C. Corkum. (Louisiana State University). Transmammary Infection with Mesocercariae of *Alaria marcianae*.
- 2:43 120. Liberatos, James D. and Robert B. Short. (The Florida State University). Identification of Sex in Schistosome Larval Stages.
- 2:56 121. Danford, Donald W. and James E. Joy. (Marshall University). Aspidogastrid Trematodes from Bivalves in Southwestern West Virginia.
- 3:09 122. Harley, John P. and Gary L. Uglem. (Eastern Kentucky University and University of Kentucky). Acetylcholinesterase Activity in Three Species of *Proterometra* (Trematoda: Azygiidae) Cercariae.
- 3:22 BREAK
- 3:35 123. Kyle, Dennis E. (Clemson University). Larval Aporocotylid Digenetic Trematodes in Polychaete Annelid Hosts.
- 3:48 124. Bakewell, George E. and James E. Joy. (Marshall University). The Occurrence of *Proteocephalus ambloplitis* Pleurocercoids Infesting the Visceral Organs of *Micropterus salmoides* and *Micropterus punctulatus*.
- 4:01 125. Toole, Joseph E., Wesley L. Shoop, Leon F. Duobinis-Gray, and Kenneth C. Corkum. (Louisiana State University). Observations on the Natural History of *Linstowiella szidati* (Anderson, 1944).

FRIDAY MORNING, APRIL 15

Plant Systematics, Session III—Room 172

Presiding: *Dr. Jean W. Wooten*, University of Southern Mississippi

- 9:15 126. Urbatsch, Lowell E. and James R. Wussow. (Louisiana State University). The Mexican and Central American Species of *Calea* L.
- 9:28 127. Jones, Samuel B., Jr. (The University of Georgia). A Synoptic View of the Compositae Genus *Vernonia*.
- 9:41 128. MacLeish, Nanda F. F. (University of Georgia). Systematics of *Eremanthus* Less. and Related Syncephalous Vernonieae Genera.
- 9:54 129. Stutts, John G. (University of Georgia). *Vernonia* Subsection *Chamaedrys* Cabrera.
- 10:07 130. Huck, Robin B. (University of North Carolina). Systematics and Reproductive Biology of *Dicerandra* (Labiateae).
- 10:20 131. Lee, Martha, James H. Horton, and Garrett A. Smathers. (Western Carolina University and National Park Service). Reproductive Studies of *Parnassia asarifolia* Vent.
- 10:33 132. Stucky, Jon M. (North Carolina State University). Comparative Reproductive Biology of Two Sympatric Species of *Ipomoea* (Convolvulaceae).

Animal Ecology, Session I—Room 173

Presiding: *Dr. Robert Jaeger*, University of Southwestern Louisiana

- 9:15 133. Vanessa, Davis O., Reanold Hawkins, and Syed M. Naqvi. (Southern University). Toxicities of Selected Pesticides (Cutrine-Plus®, Endosulfan, MSMA, and Treflan) to Fresh-water Zooplanktonic Organisms.
- 9:28 134. Parsons, Keith A., Armando A. de la Cruz, and David L. Stites. (Georgia Institute of Technology, Mississippi State University, and Emory University). Insect Diversity of a Burned and Unburned *Juncus* Marsh in Mississippi.
- 9:41 135. Willig, Michael R., Thomas E. Lacher, Jr., and Michael A. Mares. (Loyola University, West Washington State University, and Stovall Museum of Science and History). Species-

Area Relations: An Empirical Evaluation of the Linearity Assumption in Island Avifaunas.

- 9:54 136. White, JoAnn and Monte Lloyd. (The University of North Carolina and The University of Chicago). *Massospora cicadina* Conidial Infections in Emerging Periodical Cicada Nymphs.
- 10:07 137. Williams, Ray S. and J. Frank Randall. (Appalachian State University). Avian Predation of Prepupae of *Diprion similis*.
- 10:20 138. Shively, Stephen H. and James F. Jackson. (University of Southwestern Louisiana). Factors Limiting the Upstream Distribution of the Sabine Map Turtle, *Graptemys ouachitensis sabinensis*.

Ichthyology and Herpetology, Session II—Spanish Room

Presiding: *Dr. H. Dickson Hoese*, University of Southwestern Louisiana

- 8:30 139. Conner, John V. and William M. Brenneman. (Gulf States Utilities Company and Louisiana State University). An Ichthyological Cross-Section of the Mississippi River and Associated Environments Near St. Francisville, Louisiana.
- 8:43 140. Thompson, Bruce A. and Royal D. Suttkus. (Louisiana State University and Tulane University). A Comparison of the Fish Community of Lake Pontchartrain Between 1953 and 1978.
- 8:56 141. Jackson, James F. and Stephen H. Shively. (University of Southwestern Louisiana). A Distinctive Population of *Graptemys pseudogeographica* from the Calcasieu River System.
- 9:09 142. Moore, John T. and Jerry L. West. (Western Carolina University). Relationships Between Suspended Solids and Trout Standing Crop Biomass and Recruitment in Selected Western North Carolina Streams.
- 9:22 143. Stein, Diana W., James S. Rogers, and Robert C. Cashner. (University of New Orleans). Preliminary Study of Isozyme Variability in the Cherryfin Shiner, *Notropis (Lythrurus) roseipinnis* Hay.
- 9:35 144. Graham, J. H. and J. D. Felley. (Rutgers University and McNeese State University). Populations of Hybrids Between *Enneacanthus gloriosus* and *E. obesus*: Genetic and Morphological Analysis.
- 9:48 145. Pounds, J. Alan, James F. Jackson, and Stephen H. Shively. (University of Florida and University of Southwestern Louisiana). Allometric Growth of the Hind Limbs of Some Terrestrial Iguanid Lizards.
- 10:01 146. Sanderson, William Edward. (Louisiana State University). Taxonomy of the Green Water Snake, *Nerodia cyclopion*.
- 10:14 147. Frazer, Nat B. (University of Georgia). Survivorship of Adult Female Loggerhead Sea Turtles, *Caretta caretta*, in the Wild.
- 10:27 148. Morreale, Stephen J., Justin D. Congdon, and J. Whitfield Gibbons. (Savannah River Ecology Laboratory). The Significance of Terrestrial Activity in the Slider Turtle (*Pseudemys scripta*).
- 10:40 149. Snyder, David H. (Austin Peay State University). The Apparent Crash and Possible Extinction of the Green Salamander, *Aneides aeneus*, in the Carolinas.

Genetics, Cytology, and Developmental Biology, Session II—Room 389

Presiding: *Dr. Terry Ashley*, University of Tennessee

- 9:15 150. Taylor, Rosannah, John E. Mayfield, and Walter C. Shortle. (Atlanta University and Northeastern Forest Experiment Station, U.S.D.A. Forest Service). Effects of Catechol on the Ultrastructure of *Polyporus versicolor*.
- 9:28 151. Darden, William H., Jr. and Douglas Brooks. (University of Alabama). Developmental Effects of Concanavalin A on *Volvox aureus* M-5.

- 9:41 152. Brooks, Douglas and William H. Darden, Jr. (The University of Alabama). Effects of the Lectin Concanavalin A on Male Induction in *Volvox aureus* M-5.
- 9:54 153. Stewart, Cecilia, W. Lena Austin, and L. Frederick. (Howard University). Membrane Regulation of the Pitted Wall of *Gelasinospora* Ascospores.
- 10:07 154. Frederick, Lafayette and W. Lena Austin. (Howard University). Development and Structure of the Rib Layer and the Perisporium in *Neurospora* Ascospores.
- 10:20 155. Jackson, Lynda F. (Howard University). The Effects of Siderophores on the Circadian Rhythm of *Neurospora crassa*.
- 10:33 156. Carvalho, Shela A., J. M. Stucky, and C. E. Anderson. (North Carolina State University). Development of the Ovule of *Ipomoea purpurea*.
- 10:46 157. Akinyemi, Robert F. and John P. Rier, Jr. (Howard University). Morphogenesis of Tissue Cultures From *Cola acuminata* (P. Beauv.) Schott and Endl.

Parasitology, Session III—Greek Room

Presiding: *Dr. John Harley*, Eastern Kentucky University

- 9:15 158. Duobinis-Gray, Leon F. and Kenneth C. Corkum. (Louisiana State University). Monogenetic Trematodes of Various Louisiana Fishes.
- 9:28 159. DeMont, David J. (North Carolina State University). Characteristics of a *Dermocystidium* sp. Infecting *Lepomis macrochirus* in North Carolina.
- 9:41 160. Stringfellow, Frank. (Animal Parasitology Institute, USDA). A Unique Bioassay: *Haemonchus contortus* Adult Male Spicule-sheaths Attract Conspecific Larvae.
- 9:54 161. Sheridan, Mark, James Joy, and Donald Tarter. (Marshall University). The Occurrence of the Acanthocephalan *Pomphorynchus bulbocolli* in Freshwater Drum From the Ohio River, Mile Point 279.
- 10:07 162. Patton, Sharon. (University of Tennessee). Natural Transmission of *Capillaria hepatica* to Baboons at the Knoxville Zoological Park.
- 10:20 163. Trammel, Herbert E. and Sharon Patton. (University of Tennessee). Gastrointestinal Parasites Found in Wild Bobwhite Quail from West Tennessee.

FRIDAY AFTERNOON, APRIL 15

Aquatic Ecology, Session I—Room 174

Presiding: *Dr. Judy Stout*, University of South Alabama and Dauphin Island Sea Lab

- 1:30 164. Waldrop, Ron D. (Louisiana State University). Characteristic Seasonal Conditions in Lower Barataria Bay, Louisiana.
- 1:43 165. Rozas, Lawrence P. and Courtney T. Hackney. (University of North Carolina at Wilmington). Utilization of Oligohaline Intertidal Rivulets by Fishes and Macrofaunal Crustaceans in the Cape Fear River Estuary, North Carolina.
- 1:56 166. Ranasinghe, J. Ananda. (University of Alabama). Variation in Estuarine Benthic Macroinfaunal Communities: A Benchmark Study.
- 2:09 167. Bishop, T. Dale. (University of Georgia). Analysis of the Structure of Polychaete Communities from Two Intertidal Marshes.
- 2:22 168. Fox, Jan I. (Marshall University). An Ecological Assessment of Benthic Macroinvertebrates in the Little Kanawha River, Braxton County, West Virginia.
- 2:35 169. Tarter, Donald C., Dwight L. Chaffee, and Kimberly B. Benson. (Marshall University). Low pH Tolerance, under Laboratory Conditions, of the Nymphs of Three Congeneric Mayflies, *Baetisca berneri*, *B. carolina*, and *B. lacustris*.
- 2:48 BREAK

- 3:01 170. Pratt, James R. and John Cairns, Jr. (Virginia Polytechnic Institute and State University). Export of Species from Sources of Differing Maturities.
- 3:14 171. Williams, Louis G. (University of Alabama). Assessment of the Professional Management for Developing, Researching, Teaching, and Enforcing Enviro-Ecologic Regulations for Use by Applied Aquatic Ecologists.
- 3:27 172. Hylton, Roberta E. (Tennessee Technological University). The Biological Effects of Bank Stabilization Structures on Fish in Fort Loudoun Reservoir.
- 3:40 173. O'Bara, Christopher J. and R. Don Estes. (Tennessee Technological University). Physical, Chemical, and Biological Characteristics of a Stream Receiving Acid Mine and Oil Field Runoff.
- 3:53 174. Potter, Jeanne M. and Wayne A. Potter. (The Potomac Electric Power Company and Wayne A. Potter Environmental Consultants). Chlorine Reduction Studies at Two Estuarine Power Plants in Maryland.
- 4:06 175. Fury, Jon R., Christopher J. O'Bara, and R. Don Estes. (Tennessee Technological University). An Investigation into the Declining Aquatic Macrophyte and Fish Populations of Woods Reservoir, Tennessee.

Animal Ecology, Session II—Room 171

Presiding: *Dr. JoAnn White*, University of North Carolina and University of Southwestern Louisiana

- 1:30 176. McMurtray, Jennifer D. (University of Georgia). Hatching Success of Eggs Remaining in Loggerhead Sea Turtle Nests Partially Depredated by Raccoons.
- 1:43 177. Clemmer, Sherrill M. and Dwayne Wise. (Mississippi State University). A Biased Sex Ratio in the Northern Mole Cricket.
- 1:56 178. Duckett, Richard and James Grimm. (James Madison University). The Effects of Different Light Intensities, Temperatures, and Color on the Feeding Behavior of *Odonata* Naiads.
- 2:09 179. Jaeger, Robert G. (University of Southwestern Louisiana). Territorial Behavior of Terrestrial Salamanders.
- 2:22 180. Martin, David L. (University of Southwestern Louisiana). Home Range and Movements of the Cottonmouth, *Agkistrodon piscivorus*, in Southern Louisiana.
- 2:35 181. Jerome A. Jackson. (Mississippi State University). Range Expansion of the Armadillo (*Dasyus novemcinctus*) in the Mid-South.

Plant Systematics, Session IV—Room 172

Presiding: *Dr. Lowell Urbatsch*, Louisiana State University

- 1:30 182. Hardin, James W. (North Carolina State University). The Fine Structure of Pale, White, and Glaucous Leaves.
- 1:43 183. Chance, Gail D. and John D. Bacon. (Louisiana State University and The University of Texas at Arlington). Systematic Implications of Seed Coat Morphology in the Genus *Nama* (Hydrophyllaceae).
- 1:56 184. Wiersema, John H. (University of Alabama). Seed Morphology of *Nymphaea* Subgenus *Hydrocallis* and Its Phylogenetic Significance.
- 2:09 185. Massey, Jimmy R. (University of North Carolina). Nutlets, Achenes, and Schizocarps. What Kind of Fruit Does a Maple Have?
- 2:22 186. Tucker, Shirley C., and Kittie Derstine. (Louisiana State University). Unidirectional Versus Centripetal Initiation of Organs in Leguminous Flowers.
- 2:35 187. Gandhi, K. N. and R. Dale Thomas. (Northeast Louisiana University). Staminal Arrangement in *Croton* spp.
- 2:48 BREAK

- 3:01 188. McLeod, Don. (Mars Hill College). The Vascular Flora of a Small Southern Appalachian Bog-Fen.
- 3:14 189. Aulbach-Smith, Cynthia A. and Douglas A. Rayner. (University of South Carolina and South Carolina Wildlife Department). Atlas of the Vascular Flora of South Carolina.
- 3:27 190. Petersen, Raymond L. and Arvilla C. Payne-Price. (Howard University). Ethnobotanical Report on a Herbalist of Chatham County, North Carolina.
- 3:40 191. Pittillo, J. Dan and Martha Lee. (Western Carolina University). Development of Herbarium Vascular Plant Sets.

Plant Ecology, Session III—Room 173

Presiding: *Dr. William Conner*, Louisiana State University

- 1:30 192. Fedders, James M. and William H. Martin. (Eastern Kentucky University). The Vegetation of the Spencer-Morton Preserve, Powell County, Kentucky.
- 1:43 193. Powers, Maureen T. (University of Alabama, Dauphin Island Sea Lab). Multivariate Analysis of Alluvial Hardwood Swamps of the Upper Mobile Delta.
- 1:56 194. McLeod, Don and Jo Ann Croom. (Mars Hill College). Vegetation Patterns and Habitat Types in a Small Appalachian Bog-Fen.
- 2:09 195. Wall, Richard L. (Western Carolina University). Water Chemistry of Storm Events in a Virgin Forest Watershed.
- 2:22 196. Porcher, Richard D. (The Citadel). Natural Diversity in the Francis Marion National Forest.
- 2:35 197. Churchill, Lisa A. and Steven M. Jones. (Clemson University). Relating Species Patterns to Site Index in Loblolly Pine Stands on the Savannah River Plant Site.
- 2:48 198. Martin, William H. and Harvey L. Ragsdale. (Eastern Kentucky University and Emory University). The Role of Vegetation Mapping in Environmental Assessment.
- 3:01 BREAK
- 3:14 199. Parr, Patricia Dreyer and Fred G. Taylor, Jr. (Environmental Sciences Division, Oak Ridge National Laboratory). Effect of Fluoride Fumigation and Acid Precipitation on Accumulation of Fluoride in Soil.
- 3:27 200. Bonfert, Gretchen A. (Southern Illinois University). Reclamation with Little Bluestem and Switchgrass on Pre-Law Mine Spoil in Southern Illinois.
- 3:40 201. McLeod, K. W., T. G. Ciravolo, and K. C. Sherrod, Jr. (Savannah River Ecology Laboratory). Fertilization of Pine Forests: Canopy Response.
- 3:53 202. Hodge, Alston E. and Rebecca R. Sharitz. (Clemson University and Savannah River Ecology Laboratory). Vegetation Analysis of a Thermal Swamp Area.

Cryptogamic Botany, Session I—Spanish Room

Presiding: *Dr. Russell Chapman*, Louisiana State University

- 1:30 203. Bullman, Vandel. (University of Southwestern Louisiana). The Seasonal and Linear Distribution of Benthic Algal Communities of a North Carolina Mountain Stream.
- 1:43 204. DePriest, Paul T. (University of Tennessee). The Macrolichen Flora of Unaka Mountain, Unicoi County, Tennessee—Yancey County, North Carolina.
- 1:56 205. Wallace, James W., Mary Chapman, Joe Sullivan, and T. N. Bhardwaja. (Western Carolina University and Government College, Ajmer, India). Polyphenolics of the Marsileaceae and Their Phylogenetic Significance.
- 2:09 206. Cooper, Ophelia and Raymond L. Petersen. (Howard University). Moss and Fern Spore Germination Responses to Mercury and Selenium Tested Singly and in Combination.
- 2:22 207. Crandall-Stotler, B. and Patricia Geissler. (Southern Illinois University and Conservatoire et Jardin Botaniques, Genève). Embryogenesis and Capsule Wall Differentiation in *Spruceanthus polymorphus*.

- 2:35 208. Blackwell, Meredith and R. L. Gilbertson. (Louisiana State University and University of Arizona). Wood-Rotting Basidiomycetes Associated with *Quercus virginiana*.
- 2:48 BREAK
- 3:01 209. Testrake, D. (Merner), H. R. Mushinsky, and J. I. Okafor. (University of South Florida). Occurrence and Distribution of *Basidiobolus* sp. in the Digestive Tract of Some Amphibians and Reptiles from Florida.
- 3:14 210. Brown, Roy Curtiss and Betty E. Lemmon. (University of Southwestern Louisiana). Ultrastructure of the *Andreaea* Spore Wall.
- 3:27 211. Roberts, Keith. (University of Southwestern Louisiana). The Phylogenetic Significance of the Flagellar Apparatus of the Siphonous Green Alga *Batophora oerstedii*.
- 3:40 212. McGuire, Robert F. (University of Montevallo). Using Numerical Taxonomic Methods to Define the Central Characteristics of *Nostoc* and *Anabaena*.

Invertebrate Zoology, Session I—Greek Room

Presiding: *Mr. Joseph Goy*, University of Southwestern Louisiana

- 1:30 213. Harrison, Frederick W. and Ronald R. Cowden. (Western Carolina University and East Tennessee State University). Histochemical Characterization of the Principal Anatomical Components of Mucoprotein Secretions of the Slug, *Limax maximus*.
- 1:43 214. Hanley, Robert W. (The University of Alabama). Notes on the Distribution of *Lepyrium shawalteri cahawbensis* Pilsbry, 1906, with Regard to Rare and Endangered Species.
- 1:56 215. Walls, Susan C. (Mississippi State University). Female Reproductive Biology of Two Freshwater Crustaceans from Temporary Forest Ponds in Mississippi.
- 2:09 216. Rogers, Robert L. and Jay V. Huner. (Southern University). Observations on Life Histories of Crawfish on Southern University Baton Rouge Campus.
- 2:22 217. Matthews, M. Melissa and Darryl L. Felder. (University of Southwestern Louisiana). Phylogenetic Distribution and Variation of a Dectylar Locking Mechanism within Brachyuran Crustacea.
- 2:35 218. Vidrine, Malcolm F. and Darryl R. Clark. (Jefferson Davis Parish Mosquito Abatement District and Coastal Zone Management, Louisiana Department of Natural Resources). A Characterization of a Fresh-Water Mussel Bed in a River in Southwestern Mississippi.
- 2:48 BREAK
- 3:01 219. Vidrine, Malcolm F. (Jefferson Davis Parish Mosquito Abatement District No. 1). Verification of Oviposition Sites of Two Water-Mites in the Subgenus *Polytax* (*Unionicola*).
- 3:14 220. Bauman, Thomas R., Jolanta M. Wilman, and Earle A. Cross. (University of Alabama). Diapause Conditions and Post-Diapause Development in the Organ Pipe Mud Dauber Wasp.
- 3:27 221. LaSalle, Mark W., Armando A. de la Cruz, and Gary L. Miller. (Mississippi State University). Energy Lost to Exuviae During Molting for *Lycosa* sp. (Lycosidae).
- 3:40 222. Reagan, Nancy L. and William C. McGimsey. (Western Carolina University). Life History of the Mygalomorph Spider *Antrodiaetus unicolor* in Western North Carolina.
- 3:53 223. McGimsey, William C. (Western Carolina University). Reproductive Biology of the Mygalomorph Spider *Antrodiaetus unicolor*.

Abstracts

ABELE, LAWRENCE and BRUCE FELGENHAUER.
Florida State University--Biogeographical
ecology of temperate and tropical American
freshwater decapod crustaceans.

The combined decapod crustacean fauna of tropical Atlantic and Pacific drainage streams in Panama consists of many fewer species than the decapod fauna of temperate Appalachian drainage streams. The tropical fauna is composed of palaemonid and atyid shrimps and grapsid and pseudoscorpionid crabs while the temperate fauna is almost exclusively cambarid crayfish. The dominant tropical shrimps have many small eggs and a planktonic larval stage which in some cases requires low salinity to complete development. Temperate crayfish and tropical pseudoscorpionid crabs have few large eggs and no larval development. Tropical shrimps occur to 1000 m elevation; pseudoscorpionid to 3000 m, the highest elevation sampled. Appalachian crayfish occur to about 1500 m elevation. Distinct differences in species composition between drainages occur in temperate areas while tropical species occur in many different drainages. Temperate crayfish seem to be habitat specialists while tropical decapods often occur over a range of microhabitats. In the tropics no congeners coexist in the same microhabitat while this is common among temperate crayfish. Differences in life history patterns and species richness may be a result of the severe pressure imposed by the tropical dry season which is relatively unpredictable in intensity and duration.

ADAMS, RODNEY D. Louisiana State University
Center for Wetland Resources--Physical Processes: Primary Determinant for Biological Interactions in the Atchafalaya Delta Ecosystem.

For the past 6 to 8 thousand years the Mississippi River has been delivering over 300 million metric tons of sediment per year to the continental shelf along Louisiana's coastline. These sediments have been molded by the interaction of riverine and marine processes into the more than 4 million hectares of wetlands

and inshore water bodies that presently comprise coastal Louisiana. Individual habitats are the result of the various physical processes that are constantly reshaping the original sedimentary deposits. Over the last 2 decades Atchafalaya Bay has evolved from an open-bay environment to one dominated by deltaic processes and landforms. These processes are responsible for a complex assemblage of habitats in the 90 square kilometer area occupied by the Atchafalaya Delta. Areas peripheral to the delta, in and adjacent to Atchafalaya Bay are significantly impacted by the river's discharges of fresh water and sediment as it diffuses through the coastal ecosystem. In addition, major engineering works have the potential for redirecting these physical processes in ways that would favor some habitats over others.

Adkison, Linda R. and W.H. Kerr Anderson.
Tulane University Medical School--Surface antigen variation observed in leukemia patients using monoclonal antibodies.

Changes in expression of surface antigens have been investigated by producing monoclonal antibodies against a human acute monocytic leukemia (AML) and testing for cross reactivity with other patients' leukocytes. In addition, cells from a patient with chronic myelocytic leukemia were tested for cross reactivity. Sixteen antibodies were prepared and tested using fluorescent staining, an enzyme linked immunoabsorbant assay, and immuno-precipitating techniques adapted in this laboratory. A previously developed monoclonal antibody, 10-75-3, which cross reacts with monocytes, platelets, and AML cells was used for a positive control antibody. Patterns of reactivity showed some antibodies specific for AML cells, some specific for normal cells, some shared between the two types, and some specific to individual patient's cells only. Antibodies specific for AML cells were able to distinguish pre-leukemic cells from leukemic cells. (Supported in part by the La. Board of Reagents Research and Development Program and the Cancer Association of Greater New Orleans.)

AKINYEMI, ROBERT F. and JOHN P. RIER, JR.
Howard University--Morphogenesis of tissue cultures from *Cola acuminata* (P. Beauv) Schott and Endl.

Cola acuminata is a tropical plant that belongs to the family, Sterculiaceae. The traditional methods of propagation are by seedling and rooted cuttings. Both of which are slow and unpredictable. Better methods were sought through tissue culture. Plants for organ and tissue culture were grown in the greenhouse from colanuts obtained from Lagos, Nigeria. Seven month-old plants were used for the initiation of callus tissues from the stem, leaf and root. Murashige and Skoog's medium (M & S) supplemented with kinetin, 2, 4-dichlorophenoxyacetic acid (2,4-D) and naphthaleneacetic acid (NAA) was found to be effective for the initiation and maintenance of callus tissues from stem, leaf and root of this plant. Murashige and Skoog's medium supplemented with 2,4-D and kinetin was effective for the initiation and maintenance of callus tissue from colanut cotyledons. However, it was found that when M & S medium was supplemented with kinetin, indoleacetic acid (IAA), indolebutyric acid (IBA) and plant material, callus initiation and maintenance was greatly improved and root development in the stem callus occurred.

ASHLEY, TERRY. University of Tennessee--
Reexamination of the case for homology between the X and Y chromosomes in mouse and man

Quantitative measurements of electron micrographs of microspread pachytene spermatocytes of two X-7 translocations (R5 and R6) of mice clearly indicate there is nonhomologous synapsis between the heteromorphic bivalents 7X-Y and X7-7. That is, the Y synapses completely with the 7 portion of the X7 and the X portion of the X7 synapses up to the proximal end of the normal 7. The break points of these same translocations conclusively establish the location of several genes on the distal quarter of the X for which there is no evidence of corresponding homologous loci on the Y. Yet synapsis of this region of the X with the Y is reported to occur during the earliest substage of pachytene. It is suggested that this synapsis is also nonhomologous and that the "precocious" desynapsis consistently observed between the X and Y is an evolved mechanism that decreases the chances of "cross over" between these two chromosomes. If the synapsed regions are nonhomologous, such an exchange would result in an X-Y translocation. Evidence that this type of exchange does occur in sex reversed individuals (both mice and man) will be reviewed. The normal sequence of XY pachytene events is maximum synapsis of the X and Y during early pachytene, followed immediately by desynapsis which leaves only a terminal association of the X and Y. It is proposed that this association is an achiasmatic connection which replaces the chiasmatic type generally occurring between autosomes.

AULBACH-SMITH, CYNTHIA A. and DOUGLAS A. RAYNER. University of South Carolina and South Carolina Wildlife Department--Atlas of the Vascular Flora of South Carolina.

A project to develop an updated atlas of the vascular flora of South Carolina was initiated in 1981. The state was divided into 13 collecting regions and a botanist in each area was selected as collection coordinator. A state-wide floristic survey was begun in 1982 and will continue for five years. Using the 1965 Atlas of the Vascular Flora of the Carolinas by Radford, Ahies and Bell as the data base, additional records were obtained from the literature and twenty-four herbaria. Ten thousand new records were added to the thirty thousand in the Atlas. The resulting updated maps were then digitized and stored on a computer. With the use of the computer system, the county record data are used to facilitate the project. Lists are produced by county or by taxon, comparative lists of counties help to determine which habitats or major groups of plants have been overlooked or undercollected in a county, and additions, deletions and changes in nomenclature are easily handled. Maps are computer generated and will be reproduced for publication at the end of the project.

BAKEWELL, GEORGE E. and JAMES E. JOY.
Marshall University--The occurrence of *Proteocephalus ambloplitis pleurocercoideus* infesting the visceral organs of *Micropterus salmoides* and *Micropterus punctulatus*.

From April through October 1981, 118 black bass--77 largemouth bass, *M. salmoides*, and 41 spotted bass, *M. punctulatus*--were collected from Beech Fork Lake, Wayne Co., West Virginia and examined for visceral helminth parasites. *Pleurocercoideus* (larval stages) of *Proteocephalus ambloplitis*, the bass tapeworm, were found infesting the mesenteric tissues, ovaries of females, and livers of basses. Students t-test showed no significant difference between the parasite loads of *P. ambloplitis* in spotted bass versus largemouth bass. Contingency chi-square analyses revealed that spotted basses had a significantly higher incidence of infestation, over largemouth bass, for *pleurocercoideus* encysted in the mesenteric tissues. No significant difference was found for infestations in the other organs. Linear regression analysis gave no significant correlation between the length of the infested basses and their parasite loads of *P. ambloplitis pleurocercoideus*.

BARKER, NANCY. Louisiana State University
Effects of fire on pitcher plants in southeast Louisiana.

In southeast Louisiana pitcher plants, *Sarracenia alata* (Wood) and *S. psittacina* Michx., occur in poorly drained pine savannahs associated with grasses, sedges and other insectivorous plants and herbs. In this study, the term "bog" is used to refer to this plant community. As yet, no pre-

vious attempt has been made to examine the effects of fire on these sites. Preliminary observations in a bog that has been burned annually for the past seven years and in one that has not been burned for at least five years revealed a lower number of pitcher plants in the unburned bog. In the absence of fire, perhaps, many of the herbaceous forbs, pitcher plants in particular, are unable to compete with the rapid expanse of grasses, sedges and developing shrub growth. To ascertain this with more certainty a prescribed burn in the unburned bog will be carried out and fire will be eliminated from the burned bog. Sixteen 20 X 20 meter quadrats have been established in which the number of clumps of *Sarracenia* and the number of leaves will be recorded. Similar quadrats will be paired. One of each of the eight pairs will be burned in December. During the next growing season, all clumps of *Sarracenia* will be reevaluated. In addition, the occurrence and abundance of other species will be observed. The number and size of the bogs have been reduced by efforts to control and prevent fires, and to convert bogs into croplands or pastures. The hypothesis that these plants have adapted to the periodic return of fire must be established in order to help perpetuate this delicate and threatened plant community.

BAUMAN, THOMAS R., JOLANTA M. WILMAN and EARLE A. CROSS. University of Alabama--Diapause conditions and post-diapause development in the organ pipe mud dauber wasp.

Studies on the life history and effects of diapausing temperature upon the post-diapause development (PDD) of this wasp were undertaken to determine if it is strictly univoltine and requires a cold chill to terminate diapause. Field studies indicate a small percentage of eggs laid in early summer appear to develop to adults without a long diapause. To determine if cold temperature during diapause influences PDD, prepupae were collected in September, exposed to temperatures ranging from 8° to 26° C for up to 16 wks and allowed to undergo PDD at 26° C. A cold chill is not required to initiate PDD in this wasp. Within each group, the degree-days (°D) required to complete development at 26° C after 4 to 8 wks of cold are rather uniform: after 8 wks of cold, the °D requirement decreases. The total °D requirement (cold + 26° C) for complete development after 4 to 8 wks of cold varies between groups: after 14 to 16 wks of cold, it appears to be uniform regardless of chill temperature.

BERT, THERESA M. Yale University--The origin and distribution of species of stone crabs (genus Menippe) throughout the southeastern United States: evidence from electrophoresis.

Traditionally, two species of stone crabs (*Menippe mercenaria* and *M. nodifrons*) have been recognized in the southwest North At-

lantic. *M. mercenaria* ranges from the leeward Caribbean islands, throughout the Gulf of Mexico, and to Cape Hatteras, NC. *M. nodifrons*, a more tropical species, is known to extend throughout the Caribbean and is also found as far north as the Campeche area of Mexico and Ft. Pierce, FL. Electrophoresis on over 20 enzyme proteins (representing over 30 codable presumed loci) was conducted on stone crabs collected throughout the southeastern United States. The results indicate that the northern section of the presently acknowledged range of *M. mercenaria* may be occupied by more than one, presently undescribed, taxon of Menippid.

BISHOP, T. DALE. University of Georgia --Analysis of the structure of polychaete communities from two intertidal marshes.

It is becoming increasingly apparent that polychaetes may play an important role in the regulation of benthic populations through their abundance and predatory activities. It is also known from trophic studies that polychaetes can comprise a considerable portion of the diet of some commercial and sports fish species. Much of this information, however, has come from studies of subtidal, benthic communities and has not been documented for the intertidal marsh system. Experimental study can often be enhanced by the accumulation of preliminary descriptive information about the organisms or system of interest. In order to gain such knowledge about intertidal polychaetes a 12 month study on a marsh island in St. Louis Bay, Mississippi was undertaken. From sediment core samples the species composition, total and species specific abundance and seasonal trends were determined for the polychaetes of a *Juncus roemerianus* and a *Spartina cynosuroides* marsh. Physical data were also collected monthly. Collections were dominated numerically by polychaetes of the family Nereidae. *Manayunkia* sp. was also commonly collected in the *Juncus* marsh. Seasonal trends and between marsh differences in composition and abundance were noted. Differences may be explainable by physical variables such as marsh inundation time but biological interactions should be explored.

BLACKWELL, MEREDITH, and R.L. GILBERTSON. Louisiana State University and University of Arizona -- Wood-rotting Basidiomycetes associated with Quercus virginiana.

A number of unusual wood-rotting Basidiomycetes are common on *Quercus virginiana* Lam. along the western coast of the Gulf of Mexico. *Poria beaumontii* (Berk. et Curt.) Cke. and *Hyphoderma* sp. appear to be restricted to outer bark of living live oaks. *Inonotus ludovicianus* (Pat.) Murr., *Laetiporus persicinus* (Berk. et Curt.) Gilberts., *Armillariella tabescens* (Fr.) Sing., and *Ganoderma lucidum* (W. Curt.:Fr.) Carst. cause butt and root rots, while

Phellinus robustus (Carst.) Bourd. et Galz. and P. gilvus (Schw.) Pat. are responsible for heart rots in the upper part of the living trees. Stereum and Phanerochaete spp. are restricted to attached and fallen dead branches. Slash is decayed by still other species of Basidiomycetes which are common on all hardwoods in the localities collected.

BONFERT, GRETCHEN A. Southern Illinois University--Reclamation with little bluestem and switchgrass on pre-law mine spoil in southern Illinois.

Native grasses may be useful in the revegetation of abandoned mined lands, due to their low nutrient requirements and permanent cover. Pasture cover on ungraded spoil banks was killed with Roundup, burned, raked, and 112 kg/ha potassium fertilizer applied (as indicated by soil tests). Little bluestem and switchgrass were dominants of upland and lowland tall grass prairie, respectively. Native grasses were seeded on east or west-facing slopes and a level area with oats for a nurse crop and hardwood mulch to control erosion. Establishment of planted and invading species was measured in 1 m² plots located systematically on the treated sites. Switchgrass averaged 36 stems/m² (22% composition), with mean height of 50.3 cm. Little bluestem averaged 53 stems/m² (30.4% composition), with mean height of 29.3 cm. Invading species averaged 42 stems/m² (28% composition). The range of invaders was from 27 stems/m² on the lower west-facing slope to 62 stems/m² on the level area. The plant growth will be presented in relation to soil moisture, temperature, bulk density, and other environmental variables.

BOULLION, KAREN J. and RUSSELL L. CHAPMAN. Louisiana State University, Baton Rouge, La. --Preliminary observations on mithramycin-stained Trentepohlia aurea (Chlorophyta) grown under various light-dark regimes.

Trentepohlia aurea Martius is a member of the green algal family Chroolepidaceae (or Trentepohliaceae), a family which possesses many unusual features, among them subaerial and often epiphytic growth. Trentepohlia generally grows on bark or wood in tropical to temperate climates, and other members of this family grow on leaves. These features and the unusual, highly specialized reproductive structures have stimulated questions regarding these algae for many years; however, the processes of karyokinesis and cytokinesis in the vegetative cells have been observed only in a very incomplete and fragmentary fashion. To fill gaps in our knowledge of these basic processes in Trentepohlia, the alga is being grown under varied light-dark regimes in order to synchronize the nuclear and cytoplasmic divisions, a technique which has been used successfully with a few other filamentous algae. Mithramycin, a fluorescent,

DNA-specific stain, is being used in conjunction with epi-fluorescence illumination to monitor growth on the different light-dark regimes. Preliminary observations have indicated that autofluorescence in plastids can be a significant barrier to observation of the nuclei. As a sidelight of this study, gametangia have been repeatedly induced on a 14:10 L-D regime, giving this technique an added attraction: a means of inducing gamete formation and thus allowing for the possibility of observing gametic fusion and zygote formation.

BOZEMAN, JOHN R., WAYNE K. WEBB, AND GEORGE A. ROGERS. Georgia Department of Natural Resources, Union Camp Corporation, and Georgia Southern College--Recent discoveries of Elliottia racemosa Muhl. ex Ell.: Seed source for the Altamaha River Watershed, Georgia.

As a part of a study for consideration of listing the Georgia Plume (Elliottia racemosa) under the Endangered Species Act (1973, Public Law 93-205), intensive exploration of suitable habitat was conducted in the upper watershed of the Altamaha River (The Forks). Prior to 1962 only one (1) small, asexual population was known to exist in the entire watershed. The discovery of large sexually reproducing populations on the lower Altamaha in 1962, 1963, and 1968 raised questions of the origin of seed source(s). Beginning in 1981 and continuing through 1982, aerial and ground explorations during the flowering season led to the discovery of nine (9) new colonies or subpopulations in Telfair County and three (3) new colonies in Wheeler County. Four of these new locations produce capsules with seed. One site consists of more than fifteen (15) acres of plants which vary in size up to 4.5" dbh and 25' in height. These populations are similar morphologically and ecologically to the lower Altamaha sites. The land surface of these new populations is eroded Miocene/Pliocene sediments. The soils are transition zones of Lakeland and Kershaw sands typically dominated by scrub oaks and longleaf pine or upland expanses of Kureb sand dominated by broad-leaved evergreen oaks and other hardwoods. These new locations are significant in two ways: (1) a probable seed source for the lower Altamaha, and (2) genetic diversity of the species in an area where the plant was thought to be near extirpation. These sites will be discussed in regard to the entire distribution of the species (60 plus colonies in 12 counties in Georgia).

BROOKS, DOUGLAS and WILLIAM H. DARDEN, JR. University of Alabama--Effects of the lectin concanavalin A on male induction in Volvox aureus M-5.

Concanavalin A (Con A) is a lectin which binds specifically to certain carbohydrate groups. When combined with the male-inducing pheromone of Volvox aureus M-5, Con A prevented induction of male colonies. This

effect was reversed by Con A inhibitors, indicating that induction is prevented by an interaction between Con A and one or more of the carbohydrate groups to which it binds specifically, rather than by a nonspecific interaction. Male induction was not prevented when colonies were treated with Con A and washed prior to treatment with pheromone. Affinity chromatography with Con A-Sepharose was used to extract pheromone from growth medium. Pheromone was eluted by Con A inhibitors, indicating that it bound specifically to Con A. These experiments suggest that induction is prevented by the binding of Con A to pheromone rather than by direct interaction between Con A and Volvox colonies and that the pheromone molecule contains one of the sugar moieties which specifically bind Con A. Pheromone was not inactivated in preliminary experiments in which it was subjected to the enzymes α -glucosidase, α -mannosidase, and β -fructofuranosidase. Experiments to determine whether enzyme-treated pheromone is inactivated by Con A are in progress.

BROWN, ROY C. and BETTY E. LEMMON. The University of Southwestern Louisiana--Microtubule systems in young spores of the moss Tetraphis pellucida Hedw.

Microtubule systems appear sequentially at the distal and proximal poles of tetrad members during mid-sporogenesis in the moss Tetraphis pellucida Hedw. The distal microtubule system, which appears immediately after cytokinesis, emanates from a microtubule organizing center (MTOC) located between the single plastid and the nucleus. Whereas the distal system is ephemeral, the proximal microtubule system, which appears slightly later than the distal system, is a more stable component of mid-sporogenesis. The proximal MTOC is an irregularly lobed, patelliform aggregation of electron-dense granules located beneath the plasma membrane at the proximal spore pole. Several bundles of microtubules radiate from the proximal MTOC and traverse the cell, enclosing the nucleus in a cone of microtubules. The proximal microtubule system is thought to function in aperture development and organelle migration. The relatively large nucleus migrates a short distance in the small spore early in the tetrad stage and maintains its acentric position at the proximal pole throughout later stages of sporogenesis. The plastid migrates later in the tetrad stage from its meiotic position parallel to the distal surface to a position perpendicular to the distal surface with one tip in close proximity to the proximal MTOC. The proximal microtubule system reaches its maximum development by the end of the tetrad stage and all micrographic evidence of it is lost in the maturation stages of late sporogenesis.

BROWN, ROY C. and BETTY E. LEMMON. University of Southwestern Louisiana--Ultrastructure of the Andreaea spore wall.
The spore wall of Andreaea (Andreaeopsida) is

unique among mosses studied by transmission electron microscopy. While the exine of other mosses is typically initiated by the accumulation of tripartite platelets of near unit membrane dimensions just outside the plasma membrane, the exine of Andreaea is deposited as discrete globules within the coarsely fibrillar network of the sporocyte wall. The sequence of wall layer development, nevertheless, is essentially like that of other mosses. The intine is deposited within the exine and the perine accumulates on the surface of the exine during the latter stages of spore maturation. The mature wall consists of three layers, the inner intine, the distinctive granular exine consisting of loosely compacted irregular globules of sporopollenin and an outer layer of perine. The perine differs ultrastructurally from the exine only in its greater degree of electron opacity.

BULLMAN, VANDEL University of Southwestern Louisiana--The seasonal and linear distribution of benthic algal communities of a North Carolina mountain stream.

Investigations of a mountain stream, Boone Fork Stream, in Watauga County, North Carolina, were made to determine the seasonal and linear distribution of benthic algal communities. In addition, data on nutrient concentration of nitrate nitrogen, ammonium nitrogen, and orthophosphate phosphorus were gathered to ascertain the effects of nutrient fluctuations on relative biomass and species periodicity. Data collected on physical and nutrient parameters indicates that Boone Fork Stream remains relatively unpolluted. It was evident that nutrient concentration had little effect on species periodicity. The algae instead demonstrated marked seasonal periodicity. Chlorophycophyta and Chrysophycophyta (particularly diatoms) were the predominant species of Boone Fork Stream preferring the spring and fall months. Seasonal periodicity was attributed to changes in light intensities and fluctuations in temperatures. Bactracospermum macrosporum favored low light intensities and high water temperatures. A strong correlation was found to exist between orthophosphate levels and subsequent changes in relative biomass at the head waters of Boone Fork Stream. A very rare species, Hamatoidea normanii, was also found in the head waters.

CAMP, D. K., Florida Department of Natural Resources, Marine Research Laboratory--Distributions and zoogeographic affinities of stomatopod crustaceans of the Gulf of Mexico.

The stomatopod fauna of the Gulf of Mexico is a diverse assemblage of 35 species in 16 genera and 8 families, representing 49% of all western Atlantic species. Endemism is low (14%), but is similar to other invertebrate groups. One species inhabiting the Gulf occurs in all tropical seas except the eastern Pacific; one also occurs in the Indo-West Pacific; one is also known from

Hawaii; two occur in the eastern Pacific; and one occurs at St. Helena Island. Latitudinal distributions within the western Atlantic of the 29 non-endemic, shelf species of the Gulf were examined. One eurythermic species (3% of total) lives in tropical, warm-temperate and cold-temperate areas; two (7%) are known only from warm-temperate areas; eight (28%) inhabit both tropical and warm-temperate areas. The majority of Gulf species (18; 68%) are distributed only in tropical seas. Latitudinal distributions within the Gulf of the 2 temperate and 18 tropical species were examined. The former are restricted in the Gulf to areas north of 28°N; the latter apparently are not restricted, for many range north of 29°N, and at least two reach 30°N or farther. There is some evidence, however, for bathymetric submergence of tropical species at northern Gulf latitudes. Habitat preference of some tropical species also influences their northerly distribution in the Gulf.

CANTRELL, G.J., JR. Vanderbilt University--The Linnean genus *Gerardia* L. and its current status.

A review of herbarium specimens has evidenced several variations in the nomenclatural handling of those taxa once included in the genus *Gerardia* L. (Scrophulariaceae) and in the application of this Linnean name. Whether of ignorance, defiance, or confusion, the treatment of these taxa do not generally follow that of Francis W. Pennell though his monographs represent, with few exceptions, the most recent taxonomic treatment for North America. A discussion of these taxa and their generic nomenclature will include reviews of synonymy of species and genera and of characteristics useful to distinguish the genera. Supported in part by National Science Foundation grant SPI-8019192.

CANTRELL, G.J., JR. Vanderbilt University--The Mexican endemic *Aureolaria greggii* (S.Wats.) Pennell and its infrageneric position.

Aureolaria greggii (S.Wats.) Pennell is restricted to the Chihuahuan desert region of Mexico and is geographically disjunct from the remainder of this hemiparasitic genus in the Scrophulariaceae. In his treatment of the family, Francis W. Pennell considered this taxon to be a separate and more primitive subgenus due to the absence of awns on its anthers. This is the first study of this species subsequent to the work of Pennell. Though field observations and herbarium studies suggest affinities to the subgenus *Pantenis*, biochemical, karyological, and anatomical, as well as more detailed morphological, studies are used to analyze the infrageneric relationships and phylogenetic position of this Mexican species within the genus *Aureolaria* Raf. Supported in part by National Science Foundation grant SPI-8019192.

CARVALHO, SHEILA A., J.M. STUCKY, and C.E. Anderson. North Carolina State University--Development of the ovule of *Ipomoea purpurea*.

It is unclear from the literature whether *Ipomoea* sp. forms a seed coat from integument or tissue near the funiculus. The current study follows the developmental pattern of the *Ipomoea purpurea* ovule from initiation of the ovule to the mature seed at the light microscope level. The development of the embryo and fate of the endosperm will also be discussed.

Chance, Gail D.¹ and John D. Bacon.² Louisiana State University¹ and The University of Texas at Arlington²--Systematic implications of seed coat morphology in the genus *Nama* (Hydrophyllaceae).

Nama (Hydrophyllaceae) comprises approximately 45 species ranging in habit from delicate annuals to robust shrubs. The species are distributed among five sections with *Nama* sect. *Nama* containing a large majority of the species. Seeds from 36 species were examined with the scanning electron microscope to determine the value of seed coat morphology as a systematic indicator. Most species exhibit distinctive sculpturing patterns. Characters such as seed size, shape and color aid in interspecific differentiation as well. Furthermore, similarities among the species in intracellular features of the testa, such as thickness of the outer testa layer and wall thickening patterns, allow for the recognition of seven seed groups within the genus. Seed coat morphology suggests that the species of sect. *Arachnoidea* and sect. *Cinerascencia* are distinct from other species of *Nama*. The species segregated into sections *Conanthus* and *Zonolacus*, however, appear to be more closely related to species of sect. *Nama* than sectional recognition would imply. Seed coat morphology also suggests several previously unrecognized relationships among the species of the large sect. *Nama*. Characters of seed coat morphology have considerable systematic import in *Nama* and suggest that an infra-generic restructuring might be in order.

CHING, CARLOS A. University of Puerto Rico--Factors affecting the larval development of the freshwater prawn *Macrobrachium heterochirus* under laboratory conditions in Puerto Rico.

Macrobrachium heterochirus has a wide distribution in rivers emptying in the Atlantic Ocean and Caribbean Sea. Little is known about the life history of this prawn. In this study eight larval stages and one post-larval stage were found before the juvenile stage. Although adults live in freshwater, the larvae require brackish water to develop. The optimal salinity for larval development was 17.5 ppt. In addition combination of different foods such as *Artemia* salina, *Chlorella* sp., fish muscle *Gadus* sp. and protozoans was needed for a successful larval rearing of this species. From this study I conclude that *M. heterochirus* larvae needing brackish water for development may indicate an invasion of this species from the sea to the rivers.

CHURCHILL, LISA A. and STEVEN M. JONES.
Clemson University--Relating species
patterns to site index in loblolly pine
stands on the Savannah River Plant site.

A supplemental guide to site quality was developed using the relationship between loblolly pine site index and occurrence of other species in loblolly pine stands on the Savannah River Plant area. Thirty-nine stands were sampled representing four loblolly pine communities existing in the study area. "Site index" and species presence data were collected on 22 plots and a site index prediction equation ($R^2 = .80$) was developed. The developed equation was tested on 13 plots. The standard error of the estimate was 8.88 feet and the equation bias was 5.00 feet. In addition, a vegetative moisture index was developed and the plots were ranked according to their respective average species ordination values, ranging from -40 to 340. This index can be applied to yield site quality classes for forest trees.

CICERELLO, RONALD R. and ROBERT S. BUTLER.
Kentucky Nature Preserves Commission and Eastern Kentucky University--The fishes of Buck Creek, upper Cumberland River system, Kentucky.

The ichthyofauna of Buck Creek, a major tributary of the upper Cumberland River below the Falls, was documented. Fifty-nine personal collections and museum records from 39 sites in the drainage revealed 74 species representing 13 families. New records for the upper Cumberland River system in Kentucky were obtained for Ictiobus bubalus, Ictalurus furcatus, and Lepomis microlophus. Notropis arifomus and Etheostoma cinereum, two species assigned protection status in Kentucky, are known from the drainage, but E. cinereum is believed to have been extirpated. A tentative list is presented of species known from adjacent drainages in the upper Cumberland River system including Lake Cumberland that possibly occur in Buck Creek.

CLEMMER, SHERRILL M. and DWAYNE WISE.
Mississippi State University--A biased sex ratio in the northern mole cricket.

Fisher's sex ratio theory predicts an unbiased ratio, achieved either primarily or secondarily. A biased sex ratio favoring females was found in the diploid sexually reproducing northern mole cricket, Neocurtilla hexadactyla (Orthoptera: Gryllidae). In order to ascertain the life cycle stage at which the distorted ratio appears, embryo squashes, dissection of nymphs, and direct observation of adult mole crickets were employed. Two populations were analyzed. In a sample of 38 lab-raised animals, there were 26 females and 12 males (chi square = 5.16, df = 1, $p < .02$). A sample of 75 wild-caught individuals yielded 55 females and 20 males (chi square = 16.32, df = 1, $p < .001$). When these samples were pooled (homogeneity chi square = 0.24, df = 1, $p > .50$), the bias was sustained (chi square = 21.24, df = 1, $p < .001$). We are investigating

whether the adjustment of the sex ratio occurs at the primary or at the secondary level.

COILE, NANCY C. University of Georgia--Flavonoids in Ceanothus americanus L. (Rhamnaceae).

During a study of the Rhamnaceae for the Vascular Flora of the Southeastern United States, detailed examination of Ceanothus was carried out as part of the treatment. A problem arose in the study of Ceanothus americanus, which had been divided into varieties americanus, intermedius and pitcheri. Intermedius was even given specific status by Pursh. Variation does exist within C. americanus and extreme morphological forms may be distinguished. However, there is a continuum and the intermediate specimens must be designated. Flavonoid profiles suggest that varietal recognition is not warranted. Two other southeastern species of Ceanothus were also examined and their flavonoid profiles were quite different from C. americanus. This suggests that C. americanus is a good taxon (without varieties). Flavonoid chemistry would be most helpful in future studies of the genus.

COMEAX, BARRY L. North Carolina State University--Nomenclature of Vitis cinerea var. floridana Munson.

Vitis cinerea var. floridana is found abundantly throughout the southeastern states in moist habitats. The use of the name V. simpsonii Munson for this grape along with its extremely variable foliage has created confusion in its identification and nomenclature. The leaf shape and margin of V. cinerea var. floridana are extremely variable and have caused several workers to assign names to some of the variation which was not well understood; i.e. V. sola Bailey, V. aestivalis ssp. divergens Rogers. The grape was initially thought to be a distinct species, V. simpsonii Munson (1887), but was later reduced to varietal status by Munson. Unfortunately Munson used the name V. simpsonii again in 1891 for another Florida grape. L. H. Bailey corrected this nomenclatural error by applying the name V. smalliana. He also recognized V. simpsonii Munson as a species. However, field evidence supports Munson's interpretation as V. cinerea var. floridana.

CONNER, JOHN V.¹ and WILLIAM M. BRENNEMAN.²
Gulf States Utilities Company¹ and Louisiana State University²--An ichthyological cross-section of the Mississippi River and associated environments near St. Francisville, Louisiana.

An overview of fish community structure was based on 11 years of sampling with various gears in the Mississippi River, adjacent lowlands, and upland streams near St. Francisville, Louisiana. Six environments

were recognized and found to have the following species totals: main river channel--82; seasonally inundated areas--78; permanent floodplain water bodies--67; lower tributary reaches--86; middle tributary reaches--76; upper tributary reaches--46. Strongest similarities were found among the three extra-riverine lowland environments. The greatest contrast was seen between the main river channel and upland streams, by virtue of their relatively high proportions of restricted species. Middle tributary reaches appeared to represent an ecotone. Collection of larvae, as well as juveniles and adults, enabled us to categorize most of the fishes as either "resident" or "transient" in individual environments and the study area as a whole. For example, 14 of the 108 total species seemed not to have reproducing populations in the St. Francisville area. Whereas most (84 percent) of the fishes were found in more than one permanent environment, only four (*Notropis venustus*, *Cambusia affinis*, *Lepomis macrochirus*, *Micropterus salmoides*) appeared to be "resident" throughout the study area.

COOPER, OPHELIA and RAYMOND L. PETERSEN.
Howard University-- Moss and fern spore germination responses to mercury and selenium tested singly and in combination.

Bioassays based on percent spore germination of the pigeon moss *Polytrichum commune* and the sensitive fern *Onoclea sensibilis* were employed to evaluate single and combined toxicities of Hg introduced as $HgCl_2$ and Se introduced as H_2SeO_3 . Toxicity assessments for Hg are: *Onoclea* LC_{50} = 1 ppm and LC_{100} = 4 ppm. *Polytrichum* LC_{50} = 0.26 ppm and LC_{100} = 0.45 ppm. *P. commune* is 4-10X more susceptible to Hg toxicity than *O. sensibilis*. The toxicity assessments for Se are: *Onoclea* LC_{50} = 13 and LC_{100} = 25. *O. sensibilis* is 6-13X more susceptible to Se toxicity than is *P. commune*. Hg-Se combination tests yielded a greater than expected toxic response than if their effects were additive. Species specific and synergistic toxic responses such as these indicate both the appropriateness of use of a spectrum of organisms and the need for increased toxic substance combination studies to better evaluate the environmental and health impacts of toxic substances.

CRANDALL-STOTLER, B. and PATRICIA GEISSLER. Southern Illinois University - Carbondale and Conservatoire et Jardin Botaniques, Genève--Embryogenesis and capsule wall differentiation in *Spruceanthus polymorphus*.

A combination of serial paraffin sectioning and SEM techniques were used to trace the morphogenetic events responsible for a pluriferent capsule wall thickening pattern in the lejeuneaceous taxon *Spruceanthus polymorphus*. Differential mitotic rates are established in the three-celled, filamentous embryo, with development proceeding most rapidly in the capsular zone and most slowly in the basal foot. A two-

layered capsule wall is generated by single periclinal divisions in each amphithecial cell prior to spore/elater differentiation. Outer wall cells expand radially and tangentially, and become highly vacuolate, while inner wall cells remain densely protoplasmic and elongate in only the tangential plane. After tetrad separation, nodular thickenings are deposited along the radial walls of the outer cells. A sheet of safranin-staining material is laid down on the inner wall surfaces of the inner cells, except in scattered pit field zones. As sporogenesis is completed, the protoplasmic contents of both inner and outer wall cells deteriorate and perforations develop at the multiple pit field locations. Precocious spore germination accompanies these final stages of wall modification.

CURRENT, WILLIAM L. and PATRICIA N. CAMPBELL. Auburn University--Serum antibodies to *Cryptosporidium* in humans with confirmed infections.

Cryptosporidium is a newly recognized zoonotic agent which produces a short-term gastrointestinal illness in immunocompetent humans and a prolonged, grave illness in immunodeficient individuals. Infection with *Cryptosporidium* was reported recently in 12 immunocompetent individuals who had direct contact with infected animals from 3 separate, unrelated outbreaks of calf cryptosporidiosis. In this paper, an indirect immunofluorescent (IIF) test was used to demonstrate antibodies to *Cryptosporidium* in sera from these 12 immunocompetent individuals and in sera from 6 subjects with an acquired immunodeficiency syndrome and persistent cryptosporidiosis. Marked sero conversion accompanied recovery from infection in immunocompetent individuals and their IIF titers remained high for at least one year. No antibodies to *Cryptosporidium* were detected in sera from 2 subjects with hypogammaglobulinemia, normal T-cell function, and persistent cryptosporidiosis, or in sera from individuals not exposed previously to *Cryptosporidium*. Very little or no IIF cross reactivity to other coccidian species tested was observed. Application of this IIF procedure along with recently-developed techniques to detect oocysts in the feces, should provide the basis for a more accurate assessment of the number of individuals within any subject group with previous and active infections of *Cryptosporidium*.

DANFORD, DONALD W. and JAMES E. JOY. Marshall University--Aspidogastroid trematodes from bivalves in southwestern West Virginia.

Aspidogaster conchicola and *Cotylaspis insignis* were the only two aspidogastroid trematodes recovered in a year-long study involving 500 mussels (22 species) collected from a thirteen county area in southwestern W. Va. Only ten species of mussels were

infested with trematodes: Pleurobema cordatum (100%); Anodonta grandis (80%); Potamilus alatus (61%); Tritogonia verrucosa (54%); Strophitus undulatus (36%); Quadrula quadrula (33%); Amblema plicata (31%); Quadrula pustulosa (25%); Lampsilis ventricosa (8%); Lampsilis radiata leuteola (8%). A total of 1038 trematode individuals (961 A. conchicola; 77 C. insignis) were recovered from the above clams. Parasite load was greatest in P. alatus at 40 per host, and lowest in L. r. leuteola at 2.5 per host. Numbers of A. conchicola were highest in P. alatus at 40 per host, and lowest in L. r. leuteola at 4.0 per host. Numbers of C. insignis were highest in Q. pustulosa at 33 per host, and lowest in L. r. leuteola at 2 per host.

DARDEN, WILLIAM H., JR. and DOUGLAS BROOKS
University of Alabama--Developmental effects of concanavalin A on Volvox aureus M5.

Concanavalin A (Con A) at concentrations of 25 and 50 µg/ml was tested for its effects on the vegetative development of Volvox aureus M5. Treatment with Con A led to a variety of effects including blocking of inversion, abnormal inversion, delayed or non-release of daughter colonies, granulation of somatic cells, discoloration of colonies, loss of motility and the formation of a variety of types of fibers and strands associated with the colonial matrix and developing embryos. These effects were not found when Con A was administered concomitantly with methyl α-D-glucopyranoside or methyl α-D-mannopyranoside. Some of the effects could be partially or completely reversed after 24 hours contact with Con A by washing colonies and resuspending them in fresh medium or in methyl α-D-glucopyranoside or methyl α-D-mannopyranoside. Whether or not reversal occurred was dependent upon the particular developmental stage treated with Con A.

DAVENPORT, L. J. University of Alabama--A monograph of Hydrolea (Hydrophyllaceae). Hydrolea is a genus of semi-aquatic plants native to the eastern United States, Central and South America, Africa and tropical Asia. The genus is characterized by its alternate leaves, axillary or terminal inflorescences of blue or white flowers, and bilocular capsules. Brand, in the most recent treatment of Hydrolea (Das Pflanzenreich, 1913), divided the genus into two sections and recognized five Eastern Hemisphere and 14 Western Hemisphere species, along with numerous infraspecific taxa. The current study utilized traditional herbarium techniques, multivariate numerical methods and scanning electron microscopy and resulted in the recognition of 11 species--four Eastern Hemisphere and 7 Western Hemisphere. The two established sections were retained due to differences in base chromosome number as well as differences in placental, thorn, flower size and pubescence characters. Species of Hydrolea are distinguishable largely on the basis of stem pubescence, leaf

shape, presence or absence of axillary thorns, sepal shape and pubescence, corolla color, seed morphology and inflorescence type.

DAVIDSON, JEAN L. University of Tennessee--Lake in the Woods: Evidence of mid-Holocene landscape change in Cades Cove, Great Smoky Mountains.

Paleoecological analysis of woodland hollow ponds provides evidence of fine-scale vegetation change. The results of the study of pollen, plant macrofossils, fungi, and charcoal influx from Lake in the Woods indicate local vegetation changes which reflect landscape changes in Cades Cove since the mid-Holocene. The primary genera represented at the base of the core (124 cm.) are Quercus, Liquidambar, Salix, and Castanea with Cephalanthus and Isoetes. Peak abundances of Salix at 6300 B.P., 5500 B.P., and 2000 B.P. signify that disturbance regimes dominate the landscape forming processes around the lake. High influx rates at 6300 B.P. coupled with a Salix peak are indicative of episodes of colluviation with accompanying sheetwash. Conditions within the lake basin stabilized at 5000 B.P. allowing Cephalanthus to dominate the basin to the partial exclusion of arboreal species. The open basin collected more pollen of herbs and drier upland species i.e. Quercus and Castanea. The vegetation around the lake at 3000 B.P. reflected fluvial disturbance in nearby habitats as major creeks retreated from the lake and incised their channels in response to lowered base levels of the Little Tennessee River. By 2000 B.P. conditions had again stabilized and Cephalanthus and Liquidambar became locally dominant. Pinus competed with Quercus in the drier sites of Cades Cove from 1600 B.P. to present. Climatically induced changes in Holocene landscapes have shaped the vegetation around Lake in the Woods in the southern Blue Ridge Mountains.

DAY, J. W., C. J. MADDEN, AND J. CAFFREY. Louisiana State University, Center for Wetland Resources--Nutrients Dynamics in the Atchafalaya-Fourleague Bay Ecosystem. Fourleague Bay is strongly influenced by the freshwater discharge of the Atchafalaya River. Upon entering the bay, nitrate-rich river water interacts with the bay bottom, and the surrounding marshes resulting in a nitrate concentration drop from 65 µg-at/l in the upper estuary to 25 in the lower estuary. Sediment nutrient flux measurements show an average nitrate loss of 19.4 µg-at/m²/hr to the bay sediments suggesting that denitrification may account for decline in water column concentrations. Measurements in marsh tidal inlets show that water draining the marshes holds only 60% the nitrate concentration of water entering the marsh. Ammonium levels in marsh drainage are as high as three times the levels in the bay. During low discharge conditions, the lower estuary becomes N-limited

with N:P ratios of 1.5:1. The fresh upper estuary is always P-limited with N:P ratios of 70:1. The marsh is accreting at an average rate of 1.2 cm/yr with the greatest build-up occurring in streamside marsh. Sedimentation accounts for 50-90% of the N and 100% of the P input to the marsh. Nitrogen-fixation accounts for 50% of the N input to inland marsh and only 10% to streamside marsh.

DEMONT, DAVID J. North Carolina State University--Characteristics of a Dermocystidium sp. infecting Lepomis macrochirus in North Carolina.

Dermocystidium infections in young bluegill sunfish (Lepomis macrochirus Rafinesque) were studied over a three-year period. Infections were characterized by elongate, white, cylindrical cysts in the dermis of body and fins, especially the head. Cysts were thick-walled, 1.79 (0.06-5.10) mm long and 0.53 (0.02-0.73) mm wide. Robust cysts containing mature spores tended to become slightly vermiform. Fresh spores measured in water were round, 9.0 (6.8-11.3) μ m in diameter, and each contained a round, refractile, acentric, inclusion body 5.2 (3.4-5.6) μ m in diameter. Only bluegills less than 50 mm in total length were infected and cysts were present only during the cold months of each year. Other fish species in the study area were not infected. Infected fish brought into the laboratory suffered little mortality. Cysts matured, ruptured discharging spores into the water, and lesions healed rapidly. The characteristics of this bluegill parasite suggest that it is a new species.

DEPRIEST, PAULA T. University of Tennessee, Knoxville--The Macrolichen Flora of Unaka Mountain, Unicoi Co., TN-Yancey Co., NC.

Unaka Mtn. is an isolated spur of the southern Appalachian Mts. located in northeastern Tennessee--northwestern North Carolina. The mountain reaches an elevation of 5200 ft. and includes coniferous and northern deciduous forest, heath slicks and gardens, and grassy meadows typical to this region. Unique to this mountain are major rock exposures due to fire disturbance early in this century. A floristic analysis of the elevational zone between 3000 ft. and the summit documented the presence of 141 species of foliose and fruticose lichens in 34 genera. Genera with the most numerous species were: Cladonia, 24; Parmelia, 12; Hypotrachyna, 11; Parmotrema, 8; Usnea, 8; Heterodermia, 7; and Parmelina, 6. Information concerning substrate preferences, ecological conditions, elevational and geographical distributions, and rare and noteworthy species will be presented.

DITTY, JAMES C. and ROBERT J. CANCZAK. Louisiana Department of Wildlife and Fisheries--Spawning of red drum, Sciaenops ocellatus, and spotted seatrout, Cynoscion nebulosus, along coastal Louisiana.

Data from Louisiana supported historical information from the Gulf of Mexico on

location of red drum spawning and subsequent transport of larvae into the estuary on flood tides. The majority of spawning occurred between August and October. Water temperatures were usually above 25°C and nearshore salinities between 20-30 ppt over this period. Spotted seatrout spawned from April through September, peaking between June and August. Water temperatures ranged from about 20°C in April to 30°C in September; salinities usually fluctuated between 10-30 ppt in the estuary.

Information on location and preferred spawning habitat was inconclusive.

DOLAN, REBECCA WILCOX. University of Georgia and Savannah River Ecology Laboratory--Aspects of the demography and life history of Ludwigia leptocarpa.

Ludwigia leptocarpa Nutt (Hara) (Onagraceae) is a fugative species which colonizes temporary, exposed, semi-aquatic habitats such as mudflats. The species exhibits a Deevey Type III survivorship curve; many more seeds are produced than eventually become established. It is proposed that features of the life history of L. leptocarpa such as seed retention in capsules over the winter, timing of release from dormancy, and staggered dispersal are 'bet-hedging' strategies which help to insure that at least a small percentage of seeds is available for germination when environmental conditions are favorable.

DOLAN, T.E. University of Georgia -- Mitosis in Monoblepharella sp.

Mitosis in Monoblepharella sp. (class Chytridiomycetes) has been studied with a combination of light and electron microscopic techniques. Nuclear condition in a population of germinating zoospores attached to coverglasses was monitored with fluorescence microscopy. The DNA specific dye mithramycin was used to select nuclei in specific mitotic stages. Following fixation and flat embedding in resin, selected nuclei were serial ultrathin sectioned and examined with the electron microscope. The ultrastructural components of the mitotic apparatus have been analyzed using serial section reconstruction from electron micrographs. Prior to this study information was lacking on mitosis in monoblepharidalean fungi. The ultrastructural data on mitosis in this study will be compared with that available on other Chytridiomycetes. Comparative studies on mitosis may be useful in assessing phylogenetic and/or taxonomic relationships between the orders of Chytridiomycetes.

DOYLE, JAMES. University of North Carolina, Chapel Hill--Flavonoids and isozymes of the Opuntia humifusa complex. Opuntia humifusa (Raf.) Raf. is found from New England to Florida, from the Atlantic Coastal Plain to west of the Mississippi.

It intergrades with Opuntia drummondii and Opuntia stricta along the Atlantic and Gulf coasts. Due to its ability to reproduce asexually, minor variants can become the dominant form in a given area. The morphology appears to be extremely variable and highly responsive to the local environment. All these factors have contributed to the confusion concerning the taxonomic treatment of this species complex. Various authors have recognized from 3 to 26 species in this complex. Little experimental work has actually been done however. In the present study, analyses of flavonoid patterns and isozyme systems were undertaken to help understand the variation patterns and the relationships among the taxa. Flavonoid patterns show correlation with morphologic characters used to recognize taxa. Twelve enzyme systems were resolved by electrophoresis, and six exhibited heterozygosity. The smaller degree of environmental plasticity in these characters allows a more accurate assessment of the relationships among the taxa, as well as a possible technique for determining the relative importance of sexual vs. asexual reproduction.

DRAPALIK, DONALD J. Georgia Southern College--The effects of fire and bedded site preparation on a population of *Elliottia racemosa* Muhl. ex Ell. in Candler County, Georgia.

On 5 Dec. 1981, a relatively large *Elliottia* population (the Giddens Tract) was partially burned. The largest of the burned plants was 4.4 m tall with a basal stem diameter of 7.6 cm. Although most of the approximately 250 burned plants had their aerial stems completely killed, plant survival approached 100% since during the 1982 growing season vigorous new vegetative shoots grew from the burnt stem bases at the ground level. Twelve burnt plants had injured but still surviving aerial stems, and during the 1982 growing season these aerial stems exhibited the following atypical characteristics: new vegetative shoots from the ground level (12 plants); late July or earlier leaf color changes, green to red, and early leaf fall (12 plants); late, August or later, flowering with more than one inflorescence being produced per shoot (9 plants); atypical flowers (2 plants); and cauliflory (2 plants). During 25-27 June 1981, bedded site preparations for pine plantings were performed on the periphery of the population. On 20 Oct. 1982, at least 47 E. plants were observed in the site prepared areas; the largest of which was 1.1 m tall. These plants originated from injured roots and stems since this population is sexually sterile.

DUCKETT, RICHARD J. James Madison University--The effects of different light intensities, temperatures, and color on the feeding behavior of *Odonata* naiads.

Aeshna mutata Hagen naiads were individually fed live damselfly naiads under four abiotic

conditions: (1) light intensity, (2) temperature, (3) solidly colored background, and (4) a tri-colored background. *A. mutata* was tested for abiotic conditions in which prey-catching was at a minimum. In addition, *A. mutata* was tested for possible search images and whether predator or prey was responsible for prey capture. In general, the brighter the light and the higher the water temperature, the less time *A. mutata* required to catch its prey. In most cases, (1) naiads preferred labial strikes to the head over the thorax or abdomen of its prey and (2) prey was generally responsible for its own capture. Four additional prey items were used to determine if prey movement was or was not needed to elicit a labial strike by *A. mutata*. Movement was needed by a plastic pen cap, a crushed damselfly naiad, and cheddar cheese. Movement was not needed by a damselfly exuvium in eliciting a significant number of labial strikes by *A. mutata*, indicating a possible search image.

Duobinis-Gray, L. F. and K. C. Corkum. Louisiana State University--Monogenetic trematodes of various Louisiana fishes.

Between August 1981 and October 1982, 515 fishes belonging to eleven families were collected from various freshwater localities within the state of Louisiana and examined for gill trematodes. Thirty-five species of monogenetic trematodes were found, belonging to the genera *Actinocleidus*, *Clavunculus*, *Cleidodiscus*, *Dactylogyrus*, *Mazocraeoides*, *Microcotyle*, *Pseudanthocotylodes*, and *Urocleidus*. Twenty-one new state and three new host records are established. Seventy-seven percent of the monogenetic species were observed to be host species-specific. The remaining 23% of monogeneans did not cross generic barriers. This supports the concept of narrow host specificity among monogeneans.

ERDMAN, ROBERT B. and NORMAN J. BLAKE. University of South Florida--Population dynamics of three sympatric species of snapping shrimps; *Synalpheus brooksi*, *S. longicarpus* and *S. pectiniger* as sponge commensals.

Loggerhead sponges, *Spheciospongia vesparium*, provide a unique habitat for a wide array of cryptic marine organisms. Monthly sampling using SCUBA was undertaken to analyze population dynamics of snapping shrimps of the genus *Synalpheus* which are commensals of this sponge. Individuals with carapace length > 3.0 mm (n=4656) were collected over a period of one year. Of the three species studied, *S. longicarpus* was found to be numerically dominant (90.14%), followed by *S. pectiniger* (6.53%) and *S. brooksi* (3.23%). All individuals were evenly distributed throughout the sponge indicating a lack of preference for any particular portion of the sponge habitat. Density of occurrence is directly proportional to sponge volume ($r^2=0.93$), suggesting that habitat utilization is evenly distributed among the congeners and competitive exclusion is not a strong dynamic force.

ESCOBAR-B., ELVA AND LUIS A. SOTO. Instituto de Ciencias del Mar y Limnología, UNAM--Ecological behaviour of a macrobenthic community in Terminos Lagoon. Camp., Mexico.

A qualitative and quantitative analysis of the macrobenthic community associated to shrimp postlarvae of Terminos Lagoon, Mexico, was studied during a year. A total of eighty-six species was identified, the crustaceans being the most abundant and diversified group out of the eight phyla recognized. Crustacea constituted 60% of the total number of individual organisms obtained. Decapod Crustacea and gastropods together constituted nearly 40%. Crustacea was represented by 48 species, decapod Crustacea by 24 species and gastropods by 14 species. Three main species assemblages were distinguished. The first assemblage was composed of organisms characteristic of marine environments, a second group included organisms associated with freshwater conditions, and the third group encompassed organisms considered as permanent residents of the lagoon. The species associations recognized in this study revealed considerable fluctuations in the relative abundance of the predominant species, which were attributed to the precipitation regime and the tidal influence prevailing in the area.

FAIREY, JOHN E., III, ROBERT E. BALLARD, SHELBY A. HULL, and ALSTON E. HODGE. Clemson University--Flavonoid study in the genus Scleria Bergius section Scleria.

The flavonoid chemistry of Scleria ciliata Michaux, S. oligantha Michaux, S. pauciflora Muhlenberg ex Willdenow, and S. triglomerata Michaux was investigated as part of a systematic study of Scleria. Material came from plants collected in South Carolina. Scleria ciliata and S. pauciflora form a polymorphic complex with many intergrading forms. Taxonomically S. oligantha has been considered to be closely allied to the widespread S. triglomerata. All species appear to have 6-C-, 8-C-, and 6,8-di-C-glycosides of luteolin and apigenin. Methylated flavones are common within the section but do not occur in all species. The distribution of the flavonoids and the systematic significance of the results will be discussed.

FEDDERS, JAMES M. and WILLIAM H. MARTIN. Eastern Kentucky University--The vegetation of the Spencer-Morton Preserve, Powell County, Kentucky.

The Spencer-Morton Preserve, locally known as Pilot Knob, is a recently acquired nature preserve in the Knobs Border Area of east-central Kentucky. The second and third growth vegetation of the preserve was sampled from 125 .04 ha permanent circular plots. Twelve forest communities were identified by clustering analysis and subjective analysis based on plot location and logging history. Quercus, Carya, and Quercus-Carya types cover nearly 90% of the preserve. Q.

prinus is the dominant or codominant of 4 widespread communities and comprises nearly 25% of the total Importance Value (IV) of the preserve. Carya glabra, Q. alba and Q. velutina are other major community dominants or codominants. Combined, these three species comprise nearly 35% of total IV. Three distinct, successional communities are recognized, dominated by Pinus virginia, Liriodendron tulipifera or Sassafras albidum. Factors affecting the distribution of these communities are land use history, slope position and aspect.

FELDER, DARRYL L. University of Southwestern Louisiana--Warm-temperate to tropical transitions in selected decapod crustacean assemblages of the Gulf of Mexico.

The inshore decapod crustacean fauna of the Gulf of Mexico is made up of warm-temperate and West Indian or Caribbean tropical components. The latter group includes a number of eurythermic tropical species. A 6-year sampling program in the western and southwestern Gulf of Mexico, coupled with renewed surveys in the northeastern Gulf, has further characterized the decapod assemblages of inshore subregions in the Gulf and better defined zones of decapod faunal transition. Over most of the Gulf coastline there is a measurable gradation between warm-temperate and tropical components, but the more conspicuous transitions are found in northeastern Mexico and western Florida. The warm-temperate assemblages of the northern Gulf are near-Carolinian in composition but differ in at least 15% of the species makeup. Endemic species account for a part of this difference, and many of these are among the most common and conspicuous components of the inshore fauna. Relationships between the Carolinian and Gulf warm-temperate assemblages appear to reflect trans-Florida communication via a filter bridge that existed during glacial periods, but modern interpretation of assemblages in the vicinity of that bridge is complicated by its repopulation with West Indian species. Major riverine influences in the northern Gulf could account for disparities in the inshore assemblages of the northwestern and northeastern Gulf. In all such interpretations, distributions of substrates must be considered. Where comparable substrates exist on shallow expanses of the continental shelf near transitional zones, tropical assemblages extend further north in the more offshore waters.

FLEEGER, J. W., G. T. CHANDLER, G. R. FITZHUGH and F. E. PHILLIPS. Louisiana State University--Effects of currents on the distribution of meiobenthic copepods across a tidal gradient.

Salt marsh meiobenthic copepods generally show a high degree of fidelity to one location on a marsh gradient from subtidal to streamside marsh to inland marsh habitats. Many species are restricted to one portion of the gradient, however a few are found across the gradient. In an attempt to ascertain the role tidal currents play in

regulating this distributional pattern, two experimental procedures were employed. Azoic sediment, repeatedly frozen and thawed to kill metazoans, was placed in chambers in a subtidal Louisiana site, and colonization was monitored. Between 1 and 2 days post-placement, copepod densities reached background, control levels, and colonization took place most rapidly by routes open to water-borne suspension. Thus meiobenthic copepods are in the water column, and can move quickly by suspended transport over short distances. Additionally, a sampling program was conducted in an inland marsh to determine if copepods are swept out of the sediment into the water column by tidal flushing. Collections were made at low tide, on a rising tide, at slack high tide and on a falling tide. Preliminary analysis reveals that copepods enter the water column with the incoming tide, but they are probably not removed from the marsh by tidal currents. Thus, species which extend across the gradient are probably adapted to each location with relatively little migration between populations.

FLYNN, MICHAEL F. AND DARRYL L. FELDER. University of Southwestern Louisiana--A comparison of larval and post-larval development in the mordax-group of *Uca* from the northern Gulf of Mexico.

The complete larval development (and post-larval development through the fifth crab instar) of *Uca longisignalis*, *U. minax*, and *U. rapax* is described on the basis of laboratory reared specimens from Gulf of Mexico breeding populations. Larval development in each of these species proceeds through five zoeal stages and one megalopa. Development to the first crab stage generally requires 28-55 days at a salinity of 20 ppt and temperature of 25-27 C. The megalopal stage is attained in 16-29 days, and normally persists for 10-36 days. Detailed morphological comparisons were made for each developmental stage, and are discussed with respect to characters distinguishing the species and degrees of affinity among the members of this taxonomically problematic group. Larval life history is known for relatively few representatives of the genus *Uca*. The three species considered herein appear to have prolonged planktonic zoeal stages, without evidence of abbreviated development, and this is perhaps typical of the genus. Thus, the potential for planktonic dispersal and adaptations for larval retention must be considered in attempts to explain the restricted distributions of *Uca longisignalis* and *U. minax* in the Gulf of Mexico.

FOLKERTS, GEORGE W. Auburn University--Pitcher plant bogs in the Coastal Plain. Pitcher plant habitats on the coastal plain of the southeastern U.S. occur mainly in areas with a seasonally high water table or a perched zone of saturation. The biota of these sites is unique. Their existence depends on periodic elimination of competitors by fire, maintenance of the hydrologic regime, and maintenance of

the soil pH at levels significantly below neutral. The present acreage still in a nearly natural state is probably less than 5 percent of that occupied in pre-Columbian times. Fire restriction has been a major factor in the destruction of these sites. Drainage for agricultural and silvicultural uses has also eliminated many sites. Farm pond construction, channelization, canalization, road construction and urbanization are also responsible for the degradation of many areas. Preservation of these sites will entail careful management and stringent regulation of public access. Acquisition of areas by private organizations seems to be the most realistic way to assure preservation of some of these unique sites.

FOX, JAN I. Marshall University--An ecological assessment of benthic macro-invertebrates in the Little Kanawha River, Braxton County, West Virginia.

Assemblages of aquatic macroinvertebrates were inventoried in a fourth order stream to assess differences in community structure. A transect of six kick and two Suher samples were collected monthly. Benthic samples were associated with various physical, chemical and biological parameters. Nine plecopterian families were represented and a cumulative literature review (via computer) was integrated for associated stonefly parameters. Taxonomic richness and relative abundance varied spatially and temporally.

FRAZER, NAT B. University of Georgia--Survivorship of adult female loggerhead sea turtles, *Caretta caretta*, in the wild.

This paper presents a survivorship curve for adult female loggerhead sea turtles nesting on Little Cumberland Island, GA, USA, from 1964-1981. A method is described by which information on interseasonal nesting intervals may be used to adjust survivorship records for the high incidence of tag loss common to all marine turtle studies. Adjusted and unadjusted data were plotted as survivorship curves and fit by linear regression ($r^2 = .93$ and $.95$, respectively). A small-sample, one-sided t test for parallelism was used to determine that the slope of the regression for the adjusted data was significantly gentler than that for the unadjusted data ($t = 4.03$; d.f. = 21; $p < .001$). Adjusted data reveal that annual survivorship of adult females in the wild is apparently constant at 80.91% per year, indicating a maximum reproductive life span of 32 years. Maximum longevity is thus very likely < 50 years, assuming a 10-15 year age at maturity.

FREDERICK, L. and W. LENA AUSTIN. Howard University--Development and structure of the rib layer and the perisporium in *Neurospora* ascospores.

The wall surface topography of ascospores of *Neurospora* is characterized by a lineal anastomosing rib-vein pattern. This feature serves as the taxonomically delimiting char-

acter for the genus. Details relative to the delineation, development, and structure of the rib component of this layer have lacked clear resolution. We have investigated these aspects of rib development in homothallic species of *Neurospora* with light microscopy (LM), and scanning and transmission electron microscopy (SEM and TEM). Under LM, rib presence is detectable in young ascospores soon after delimitation and prior to the occurrence of any clearly discernable spore wall pigmentation. The position of ribs, as revealed by TEM, is determined by an intricate endomembrane system whose lineal profiles, intrasporal membrane plaques (IMP), become appressed to the inner surface of the spore plasmalemma immediately after the deposition of the initial wall layer of the perisporium. Deposition of rib material is effected by vesicle transport and the rib matrix is deposited on the outside of the plasmalemma only on those surfaces where no underlying IMP occur. Plasmalemma surfaces opposite IMP remain free of rib material and become the veins of the rib-vein layer. LM, SEM and TEM observations also reveal that the rib consists of a homogeneous matrix, is unstratified, is capable of radial but not tangential expansion, and becomes tubular in structure following Clorox treatment. The rib layer represents a structural and ontogenetically distinct layer of the perisporium of the ascospore wall. It develops immediately beneath the initial indistinct, thin, enveloping outer layer of the perisporium.

FREEMAN, JOHN A. University of South Alabama--Epidermal evagination during segment morphogenesis in *Artemia*.

Artemia nauplii hatch from cysts as larvae with undifferentiated thoraxes. During the first two instars the thorax grows and becomes segmented. By late premolt of the second instar, cell shape changes in the latero-ventral regions of the epidermis in the first two thoracic segments are visible beneath the old exoskeleton. After ecdysis to the third instar, these cells form evaginations which will later develop into the thoracopods. To examine the cellular mechanism involved in epidermal evagination, nauplii were maintained in seawater containing colchicine (32, 3.2, 0.32, 0.032 $\mu\text{g}/\text{ml}$) or cytochalasin-B (5, 0.5, 0.05 $\mu\text{g}/\text{ml}$) during the twelve hour period from intermolt of the second instar to intermolt of the third instar. Larvae reared in colchicine at concentrations of 32 or 3.2 $\mu\text{g}/\text{ml}$ demonstrated reduced cell shape change and latero-ventral evagination, while those exposed to lower concentrations of colchicine, or to cytochalasin-B, showed normal epidermal evagination. To further define the role of microtubules in the evagination process, third instar larvae, which already possess developing thoracopods, were treated with 32 $\mu\text{g}/\text{ml}$ colchicine for twelve hours. Thoracopod epidermal evagination was markedly reduced in these larvae. These findings suggest that microtubules are involved in epidermal cell shape change during thoracopod morphogenesis. (Supported by a grant from the University of South Alabama Research Committee).

FURY, JON R., CHRISTOPHER J. O'BARA and R. DON ESTES. Tennessee Technological University--An investigation into the declining aquatic macrophyte and fish populations of Woods Reservoir, Tennessee.

Woods Reservoir, a 4,000 acre cooling water impoundment in south central Tennessee, was once recognized for its abundant aquatic macrophytes and excellent warm and cool water fishery. Since 1977, the lake has exhibited a precipitous decline in aquatic plant growth to the point where no submerged aquatic plants are present, and only the emergent water willow is numerous. Concurrent with the decline in plant growth was a decline in the largemouth bass (*Micropterus salmoides*), white crappie (*Pomoxis annularis*), and bluegill (*Lepomis macrochirus*) fishery. Largemouth bass reproduction has been very limited and growth rates for largemouth bass, smallmouth bass (*Micropterus dolomieu*), and white crappie have been found to be significantly slower in Woods Reservoir than in other Tennessee reservoirs. Largemouth bass and smallmouth bass do not reach 200 mm in total length until age 4, and white crappie until age 5. Poor growth rates have been attributed primarily to the paucity of adequate food sources. Threadfin shad (*Dorosoma petenense*) was the principal forage fish until it became virtually eliminated by a winterkill in 1977. Although juvenile centrarchids have an abundant supply of chironomid larvae and other aquatic invertebrates as a food source, adult fish are limited to gizzard shad (*Dorosoma cepedianum*) and young-of-the-year bluegill. Woods Reservoir also receives numerous point and nonpoint pollutants which may be attributed to the decline in the lentic ecosystem. These include PCB, selenium, herbicides, organics, aviation fuel, and industrial pollutants. At this point no single agent has been identified as the major causative agent.

FUSIAK, FRANK. University of Tennessee-Knoxville--A systematic study of the *Prenanthes roanensis* Complex of the southern Appalachians.

Prenanthes altissima L., *P. roanensis* (Chick.) Chick. and *P. serpentaria* Pursh were examined to determine species validity, limits and relationships. Investigations involving flavonoid chemistry, SEM, cytology and phenetics were undertaken. A total of seven luteolin glycosides were isolated and characterized. With SEM, all taxa were determined to have pollen that was tricolporate and echinolate and ligules that were transversely striate and distally rugose. Flavonoid chemistry and SEM studies indicate that interspecific differences are as great as intraspecific differences. No species-specific characters could thus be discerned using these techniques. Meiotic analysis showed all individuals to be $n = 8$ with no irregularities. Cluster and principal coordinate analyses were performed on 100 samples for 18 morphological characters. These analyses indicate that the samples can be divided into three distinct groups that correspond to the named species. These data support the recognition of three closely related but morphologically distinct species.

GAGLIANO, SHERWOOD M. Coastal Environments, Inc.--Wetlands in coastal Louisiana's future landscape

With the sobering realization that more than one million acres of Louisiana's coastal lowlands have been lost to erosion and marsh deterioration during the past 80 years and that the ever-accelerating loss rate threatens to destroy the remaining land mass within the next 150 to 200 years, resource managers must reevaluate conservation strategies. Not only will the remaining wetlands be lost, but human inhabitants may be forced to retreat from much of the coastal zone. The main issue is not whether we can save the wetlands, but whether we can save the coastal zone. Recognizing this, it becomes important to develop a survival strategy that protects the capital investment in the coastal area; this includes conservation management of wetlands and other renewable resources. The key is a planned regional multi-use geometry that provides for carefully planned and executed development corridors, arms of the sea leading into port areas, maintenance management of the barrier islands and Gulf shore, areas of controlled delta building, and conservation management of wetland and estuarine basins. Execution of the plan will require a major commitment from government at all levels, as well as from the private sector.

GANDHI, K.N. and R. DALE THOMAS. Northeast Louisiana University--Staminal arrangement in Croton spp.
A study made on the staminate flowers in Croton argyranthemus Michx., C. bonplandianus Baill., C. capitatus Michx., C. glandulosus L., C. monanthogynus Michx., and C. punctatus Jacq. suggests that staminal arrangement in these taxa belongs to the obhaplostemony, obdiplostemony, or obtriplostemony type. Any of these arrangements represents an interruption in the usual sequence of alternation in floral whorls. The presence of an extra staminal disc bearing anti-sepalous nectary glands accounts for this unusual staminal arrangement. Of different interpretations made explaining the origin of this kind of staminal arrangement, the "reduction concept" is acceptable for Croton species. The apical meristem in these staminate flowers is generally consumed in the formation of a central stamen or staminode, which is commonly utilized in the formation of a pistil or pistillode in other taxa.

GOEKE, G.D. AND R.W. HEARD. Gulf Coast Research Laboratory--Observations on the Ampeliscidae (Gammaridea: Peracarida) occurring in the Gulf of Mexico.
The distributional patterns and systematics of the Ampeliscidae occurring in the Gulf of Mexico are poorly known. The authors have been able to identify three ampeliscid genera rep-

resenting at least 14 species from Gulf waters. The specimens examined were collected from the neritic zone in conjunction with environmental assessment and impact studies. The genera Byblis and Haploops are each represented by a single species, whereas, the genus Ampelisca, which is emphasized in this study, is represented by at least 12 species, eight of which appear to be undescribed. Several of the new forms are morphologically similar and apparently closely related to species described from the northeastern Pacific. There are a number of published records for these Pacific species from the northwestern Atlantic and in particular for the Caribbean and Gulf of Mexico. Based on the results of this study, it now appears that many of these records for Pacific species have been confused with their undescribed western Atlantic gymnates.

CORE, ROBERT H. Academy of Natural Sciences Philadelphia --Zoogeographical relationship of decapod Crustacea in a subtropical transitional zone in central eastern Florida.

The central eastern Florida coast encompassing the Indian River lagoon is a zoogeographical transitional zone between the warm-temperate Carolinian faunal province to the north and the tropical Antillean province to the south. A 10 year survey of the Decapoda sampled supralittoral, freshwater, estuarine lagoonal, marine nearshore and offshore continental shelf biomes to the edge of the continental slope (425 m). Over 400 species in 198 genera and 54 families were collected, about 80% of which had zoogeographical affinities with the West Indian faunal region, particularly the Antillean faunal province. About 10% were members of the continentally-associated Caribbean fauna, and a third group was allied with the Carolinian continental fauna. About 75% of the species were "eurythermic tropicals" (sensu Briggs), but another component (ca. 5%) were species heretofore known only from the lower Caribbean or West Africa. In the latter group were members of taxonomically large families (Majidae, Alpheidae, Xanthidae). No endemism was seen. Occurrence of any taxa in one or more of 7 major biomes corresponded with habitat use, feeding modes, or habit, with the most speciose taxa usually occurring in a continuum from the lagoon to the continental shelf. Other taxa were specialists, restricted to and/or monopolizing specific biomes. Some 25% of the species did not occur farther north than the Indian River area; about 5% were not found farther south. Zoogeographic distributions seem related to ameliorative seasonal temperature extremes and an increasingly wider continental shelf allowing widespread larval settlement. The Indian River transitional zone is probably best considered as either a tropical refugium, or a warm-temperate barrier, for the species within, or adjacent to it.

GOSSELINK, JAMES G. Marine Sciences Department and Coastal Ecology Laboratory Center for Wetland Resources, Louisiana State University--Spartina marshes of the Mississippi River and deltaic plain.
On a geological time scale Gulf coast deltaic marshes are ephemeral, their life cycles con-

trolled by sediment supplied by the Mississippi River. Geologically they emerge, grow to maximum areal extent, and decay in a cycle of less than 10,000 years. Over this period salinities increase slowly and vegetation diversity decreases. Maximum biological activity and coupling with the estuary occurs during the geologic decay period when plant diversity is low and the marsh surface: edge ratio is maximum. Recent human activities in the coastal zone have reversed the 10,000-year trend of net land building: nearly all of the deltaic coastal basins are in the decay phase. As a consequence Louisiana is currently losing about 80 square kilometers of marsh each year, and the rate of loss is accelerating. Because of the time lag of biological behind geological activity estuarine-related fishery production remains high, but the present trends have serious implications for the future.

GOY, JOSEPH W. University of Southwestern Louisiana--Zoogeography and origin of the stenopodidean shrimps in the Caribbean and the Gulf of Mexico.

The zoogeographic distribution of six genera of stenopodid shrimp in the Caribbean and Gulf of Mexico is reviewed. The fifteen species that occur in the region can be divided into three groups on the basis of their depth distribution. There is a shallow water 0-40m group that is associated mainly with coral reef habitats, a 40-150m group found on various continental shelf substrates, and a 150-1500m group in which some are commensals in sponges. The deep water group below 300m is restricted to five species, while above 300m it is not so restrictive and there is much overlap between the three groups. The tropical Indo-West Pacific is taken as the center of evolution and dispersal for the shallow water species and perhaps the deep water forms as well. The distribution of the family reflects the extent of the ancient Tethys Sea with subsequent speciation during closing off of this immense expanse of tropical waters. Formation of the Isthmus of Panama led to geminate species formation in at least one genus. This paper is intended as a review of the present state of knowledge on the Stenopodidae for the region, and as a stimulus for further work on this interesting group of crustaceans.

GRAHAM, J.H. and J.D. FELLE. Rutgers University and McNeese State University--Populations of hybrids between *Enneacanthus gloriosus* and *E. obesus*: genetic and morphological analysis.

The bluespotted sunfish (*E. gloriosus*) and the banded sunfish (*E. obesus*) are morphologically similar and have been thought to hybridize. We sampled 13 populations of *Enneacanthus* in New Jersey and Connecticut. On the basis of marker alleles at 4 electrophoretically determined loci, we found that 3 locations were inhabited by *E. gloriosus*, 4 by *E. obesus* and 6 by hybrids. Individuals in the hybrid populations were morphological-

ly intermediate between the 2 species. The 2 species are ecologically distinct; hybrid populations seem to result from recent impoundments that joined discrete habitats supporting the 2 species. The lack of significant deviations in marker allele frequencies from Hardy-Weinberg expectations suggests that each hybrid population is completely introgressed, with marker allele frequencies dictated by the initial species composition and subsequent genetic drift. This was not the case for 2 other loci (GAP and alpha-GPD-2), not used as markers. Though the 2 species are characterized by different alleles at these loci, all hybrid populations showed one, fixed, allele at each locus. This suggests selection against heterozygotes at these loci. Levels of bilateral asymmetry for morphological characters were significantly greater in hybrid populations, showing that hybridization has been accompanied by disruption of genomic coadaptation in these populations.

GROSE, TERESA. Western Carolina University--Phospholipid participation in lipidic particles.

Many lipids are capable of adopting non-bilayer as well as bilayer configurations (Cullis and DeKruijff, *Biochim. Biophys. Acta* 559: 399-420, 1979). One such non-bilayer configuration, the lipidic particle, is characterized by Cullis and DeKruijff (1979) as an inverted micellar component sandwiched between lipids in a bilayer phase. Until recently it was not known if lipidic particles were composed of random assortments of the lipids in the system or if there was preferential positioning of certain lipids in each component of the lipidic particle. Recent data indicate that in phosphatidylethanolamine, phosphatidylcholine, cholesterol systems the lipids remain ideally mixed. In the present study the aminophospholipid labeling reagent trinitrobenzenesulfonate (TNBS) and rat liver non-specific transfer protein were used as probes of the available phosphatidylethanolamine pool in equimolar dioleoylphosphatidylethanolamine--dioleoylphosphatidylcholine vesicles under bilayer and lipidic particle conditions. Vesicles were prepared by sonicating the appropriate amounts of hydrated lipids. Lipidic particle conditions were induced by heat treatment. Vesicles were labeled with TNBS under bilayer and lipidic particle conditions and transfer of phosphatidylethanolamine was assessed under the same conditions. The available phosphatidylethanolamine pool under the two sets of conditions was compared to determine if phosphatidylethanolamine is preferentially associated with the inverted micellar component of a lipidic particle in this system.

Guobaitis, R. and M.B. Maddock. College of Charleston--Activation of Promutagens by Multiple Forms of Cytochrome P-450 in Toadfish Microsomes.

In mammals the mutagenicity of many promutagens is dependent upon the balance of compet-

ing metabolic pathways leading to activation or to detoxification of non-mutagenic parent compounds. The balance is determined by the relative proportions of catalytically distinct forms of the microsomal hemoprotein cytochrome P-450. We have examined the effects of inducers and inhibitors of specific forms of cytochrome P-450 on the ability of toadfish hepatic preparations (S9) to activate the activation-dependent mutagens benzo(a)pyrene (BAP), 2-aminoanthracene (2AA) and chrysene (CHR) in the Ames Salmonella (TA 98) assay for mutagenicity. Uninduced toadfish S9 activated BAP and 2AA but not CHR, while pretreatment with 3-methylcholanthrene (MC) resulted in the activation of CHR, increased activation of BAP and decreased activation of 2AA. The inhibitor α -naphthoflavone (ANF) enhanced the activation of BAP by uninduced S9 and inhibited the activation of CHR by MC-induced S9 and of 2AA by uninduced and MC-induced S9. These results suggest that multiple forms of cytochrome P-450 are involved in the activation of promutagens in this marine species. Comparative studies of promutagen activation by toadfish hepatic and renal preparations and by eel hepatic preparations are in progress.

GYLLENHAAL-DAVIS, CHARLOTTE. University of Alabama--An experimental analysis of agronomic and ecological factors affecting yields in slash-and-burn agriculture.

The effects of varying weeding and intercropping of maize and beans on maize yield were examined in an experimental field in Panama over a two year period. Analysis of variance showed that infrequent weeding resulted in significantly lowered yields. The species of weeds predominant in experimental subplots affected yields as well: grasses lowered yields more than did broad-leaved weeds. Yields in infrequently weeded plots dropped to about half their original levels in the second year of the study, while yields in more frequently weeded plots rose in the second year. Yields in all treatments dropped by the end of the second year. Multiple regression analysis revealed that soil pH and steepness of slope also affected yields, although soil nutrients did not, perhaps due to the extremely low soil pH encountered in the experimental area.

HACKNEY, COURTNEY T. and ARMANDO A. DE LA CRUZ. University of North Carolina at Wilmington, and Mississippi State University--Effects of winter fire on the productivity and species composition of two brackish marsh communities (1976-80).

Experimental treatments of the marsh were conducted in the winters of 1977, 78, and 79,

with preliminary studies made in 76 and post-experimental observations conducted in 80. The Juncus-dominated community increased the aboveground NPP as much as 51% following a fire. In the Spartina-dominated community, NPP of burned and cleared plots (simulated fire) not only increased by 25% after the first treatment, but maintained a higher NPP after two and three successive annual treatments. Early flowering and greater number of culms with inflorescences were observed in plots which were burned. Minor plant species associated with the Juncus-dominated marsh increased their biomass in plots cleared two to three consecutive years.

Ammonium nitrate fertilizer increased productivity in one Juncus community plot. However, this increase in productivity was similar to increases observed in the burned or cut plots, suggesting that nutrient enrichment equivalent to that added by ash deposition is not a decisive factor increasing productivity. Most plants growing in these brackish communities survive winter fires because they have large energy reserves stored in roots and rhizomes deep in the marsh soil. The clearing effects of fire serve to maintain a higher net aboveground primary production in these brackish communities by apparently diminishing the competitive advantage of certain species which allows other species to increase their productivity.

HAND, STEVEN C. and JOHN F. CARPENTER. University of Southwestern Louisiana--On the nature of pH-induced activation of metabolism during cryptobiotic-active life transitions.

The mechanism by which the metabolic processes of an organism are brought temporarily to a halt and then later reactivated is a fundamental problem in regulatory biology. Our central premise is that modulation of intracellular pH (pH_i) may be the primary mechanism controlling the cryptobiotic-active life transitions in many, if not all, latent life forms. Such a transition in pH_i occurs in Artemia encysted embryos upon activation from the dormant state. Our results show that the internal buffering capacity of the cyst is relatively low (10-30 slykes) and that the buffering capacity falls precipitously at a time corresponding precisely with the initiation of CO_2 -fixation in the embryo. We suggest that during cyst activation, the metabolic process of CO_2 -fixation may serve to reduce the free $[CO_2]$, and thereby reduce the cellular bicarbonate buffering capacity and foster intracellular alkalization due to equilibrium effects on the $CO_2 + H_2O \rightleftharpoons H_2CO_3 \rightleftharpoons HCO_3^- + H^+$ relationship. Furthermore, we have purified phosphofructokinase, the key regulatory enzyme of glycolysis, from brine shrimp embryos, and the kinetic/structural characterization of the protein is in progress. We propose that pH-induced protein assembly/disassembly processes for enzymes like phosphofructokinase may be important as in vivo regulatory events.

HANLEY, ROBERT W. The University of Alabama--Notes on the distribution of *Lepvrium showalteri cahawbensis* Pilsbry, 1906, with regard to rare and endangered species.

Lepvrium showalteri cahawbensis is a small freshwater snail endemic to the Cahaba River drainage. This species inhabits riffles and rapids, where it is most often found on the bottom or downstream surfaces of large rocks. Although not on the Federal Rare and Endangered species list, *L. showalteri cahawbensis* is considered to be threatened. Reportedly, this species is restricted to the Little Cahaba River, and one population in the Cahaba River. Recent surveys have revealed a greater distribution in the Cahaba River than previously recognized. The rediscovery of this species in areas from which it was supposedly eradicated illustrates the need for a more thorough knowledge of the distributions of threatened species, as well as periodic monitoring to assess changes in their population size and overall health.

HARDIN, JAMES W. North Carolina State University--The fine structure of pale, white, and glaucous leaves.

There are five types of foliar surface modifications, as seen with SEM, that affect light reflectance and, indirectly, internal temperatures and rates of transpiration. Some of these same features also play a role in defense against fungal pathogens and insect predators. These adaptations involve: (1) epidermal cell contours, (2) cuticular patterns and contours, (3) epicuticular wax, (4) trichomes and vestitures, and (5) the formation of a ferruminate layer. Any one, or combination, of these contributes to the degree of reflectance. The phyto-graphic descriptors generally used by taxonomists--pale, white, glaucous--should have either very specific meanings in terms of the fine structure (such as glaucous meaning the presence of epicuticular wax), or at least when known, should be used with modifiers that indicate the basis for the feature (e.g., white due to cuticular relief, pale and ferruminate, or white tomentose). The various combination are shown below.

epidermal contour	_____	
ferruminate	_____	pale
trichomes	_____	white
cuticular contour	_____	white
epicuticular wax	_____	glaucous

HARLEY, JOHN P., and GARY L. UGLEM. Eastern Kentucky University and University of Kentucky--Acetylcholinesterase activity in three species of *Proterometra* (Trematoda: Azygiidae) cercariae.

Acetylcholinesterase (AChE) activity was determined in *Proterometra dickemani*,

Proterometra macrostoma, and *Proterometra* sp. (sp. nov., not described) cercariae by a modification of the histochemical method originally described by Gomori in 1952. The pattern of the reaction product in the tails of the three cercarial species was decidedly different. To varying degrees, a distinctly staining transverse band, longitudinal lateral cords, and small strands terminating at the bases of the papillae are discussed. With respect to intensity and complexity, this study has revealed the most extensive distribution of AChE activity to date in *P. macrostoma*, *P. dickemani*, and *Proterometra* sp., respectively.

HARRISON, FREDERICK W. and RONALD R. COWDEN. Western Carolina University, and Quillen-Dishner College of Medicine, East Tennessee State University--Histochemical characterization of the principal anatomical components of mucoprotein secretions of the slug, *Limax maximus*.

A histochemical analysis of mucus secretion in the slug, *Limax maximus* suggests that three main elements contribute to the final secretion: sialomucin secreting amoeboid cells which become incorporated into pitted surface glands; giant unicellular protein secreting glands that are most abundant on the dorsal and dorsolateral quadrants; and acidic and neutral connective tissue mucins produced in the body wall which are probably vented through inter-epithelial channels. The ventral foot epithelium is relatively poor in epithelial glands, but contains ventrolateral bands of ciliated epithelial cells separated ventrally by columnar epithelial cells. The entire body wall, not just specialized epithelial cells, is involved in secretion. The histology of the integument has been significantly modified to allow these secretory functions. While the main anatomical components of mucoprotein secretion have been identified, the observations pose a variety of questions that can only be answered by additional experiments.

HART, C. W., Jr.,¹ T. M. ILIFFE,² and RAYMOND B. MANNING.¹ Smithsonian Institution¹ and Bermuda Biological Station² --The caves of Bermuda: biogeographical anomalies.

Marine crustaceans from Bermudan caves suggest that some components represent ancient stocks with possible ties to the deep-sea fauna, some may be Tethyan relicts, and some may be derived from Recent Caribbean populations.

HAYNES, T. B. and W. L. CURRENT. Auburn University--Completion of the Life Cycle of Human *Cryptosporidium* sp. in Cell Culture.

Cryptosporidium sp. is a parasitic protozoan that has little or no host specificity. A

variety of domestic animals have been identified as potential sources of human infection. Cryptosporidium sp. is confined to the microvillus region of host cells, primarily enterocytes in the ileum. Also, respiratory infections are known in chickens and turkeys and in several humans with the recently described acquired immunodeficiency syndrome (AIDS). Sporozoites excysted from oocysts obtained from a human with persistent cryptosporidiosis and AIDS completed the developmental cycle in human embryonic lung cells grown in tissue culture. Trophozoite and schizonts were present in lung cells from 24 through 120 hours postinoculation (PI) with sporozoites. Early sexual stages, macrogametes and microgametocytes, were first observed by 48 hours PI and oocysts were present by 72 hours PI. Oocysts sporulated within the parasitophorous vacuole of the cultured lung cells. Oocysts harvested from cell culture produced infection in mice. Sporozoites from these oocysts completed a second developmental cycle when inoculated into additional human lung cell cultures. This represents the first report of a coccidian outside the Eimeria to complete its life cycle in cell culture.

HODGE, ALSTON E. and REBECCA R. SHARITZ, Clemson University and Savannah River Ecology Laboratory--Vegetation Analysis of a Thermal Swamp Area.

The vegetation of the Savannah River swamp forest at the entrance of Four Mile Creek on the Savannah River Plant in South Carolina was sampled to evaluate response of this community to stress. Four Mile Creek has received heated reactor effluents since the early 1950s. Distinct plant community types are established along a stress gradient related to water temperature and sediment deposition. A preliminary vegetation map was prepared from infrared aerial photographs; six distinct community types were identified, five of which have been affected by reactor effluents. Detrended correspondence analysis (DCA) ordination of ground level sampling data supported the preliminary designation of six major plant community types.

HOOK, ROBERT A.,¹ WILLIAM H. MARTIN,¹ and WILLIAM H. ROMME,² Eastern Kentucky University¹ and Fort Lewis College²--Analysis of ground layer vegetation in and around treefall gaps at Lilley Cornett Woods.

At Lilley Cornett Woods in southeastern Kentucky, and in other old-growth forests in the southern Appalachians, canopy openings (gaps) frequently occur as large canopy trees fall due to windthrow and substrate instability. These gaps provide a different substrate and microclimate relative to closed canopy habitats and establishment and survival of species would be expected to be different between these two extremes. This study investigates the importance of these gaps in forest and ground layer composition. Herbaceous and woody vegetation ≤ 2 m in height was sampled in 15 openings, 0-8 years old, and

compared to adjacent closed canopy conditions at different locations in Lilley Cornett Woods. Preliminary analysis indicates that, generally, species richness is greater in openings than in closed canopy areas, although the floristic similarity among all gaps and closed canopy areas is high (74%). Thirty-six species (19% of total species) were recorded only in gaps; only three of these have substantial cover in two or more gaps. The high floristic similarity suggests that occurrence of canopy gaps may have only a minor effect on overall species composition of this forest layer. Several species occurring in both open and closed canopy conditions have substantially higher cover in gaps. Total herbaceous cover in gaps is inversely related to gap age 1-2 years after gap formation.

HOUCK, DUANE F. Southern College--Hormonal regulation of epiphyllous bud release in Bryophyllum calycinum.

The effects of various concentrations of several auxins and cytokinins separately and in combination on epiphyllous budding of Bryophyllum calycinum were investigated, using a marginal leaf strip method (Heide, 1965). The number of buds released per leaf in 10^{-6} M benzyladenine (BA) was 2.8 times greater than those in water, and 1.6 times greater in 10^{-5} M isopentyladenine (IPA). BA, IPA and kinetin were antagonistic to indoleacetic acid (IAA) or naphthaleneacetic acid (NAA) when used in combination treatments. The resulting increase in cytokinin/auxin ratio induced foliar embryo release from dormancy. The IAA oxidase cofactor p-coumaric acid (PCA) increased the number of epiphyllous buds to twice that of the water controls. This stimulatory effect of PCA on bud release suggests that an increase in IAA oxidase activity may be one of the significant changes that precedes the release of epiphyllous buds.

HOWELL-MAJOR, MARGARET, and WILLIAM R. CORDON. HOWARD UNIVERSITY - Effect of gibberellic acid on cerato-ulmin production and pathogenicity of Ceratocystis ulmi isolates.

Effects of six (6) concentrations of gibberellic acid (5×10^{-4} M thru 1×10^{-6} M) on pathogenicity and cerato-ulmin production of five isolates of Ceratocystis ulmi have been studied. The effect of CA₃ on pathogenicity was determined by growing the isolates in synthetic nutrient liquid media with and without CA₃. Filtrates from the cultures were used for bioassays. On the basis of the extent of wilting induced in elm cuttings, treated with filtrates not supplemented with

GA₃ isolates were classified as weakly, moderately and highly pathogenic. When elm cuttings were treated with filtrates from isolates grown in the GA₃ supplemented media higher wilting percentages were found at lower GA₃ concentrations and lower wilting percentages were found at higher GA₃ concentrations. Cerato-ulmin was partially purified by a procedure using the techniques of centrifugation, vacuum effervescence, ethanol evaporation, and ultrafiltration. Subsequently, the pathogenicity of the isolates were correlated with cerato-ulmin production and biological activity on elm cuttings. Isolates that were designated highly and moderately pathogenic were producers of cerato-ulmin whereas from the isolate designated weakly pathogenic, cerato-ulmin production was immeasurable. Culture filtrates of isolates from GA₃ supplemented media showed no detectable amount of cerato-ulmin. Results revealed that there is correlation between phytotoxin production or formation and pathogenicity; therefore, when phytotoxin production is inhibited there is a decrease in the pathogenic capacities of the isolates.

HUCK, ROBIN B. University of North Carolina, Chapel Hill--Systematics and reproductive biology of *Dicerandra* (Labiateae).

Length, shape and vestiture of the distinctive anther spurs of *Dicerandra* as well as placement of stamens relative to corolla shape are of diagnostic and apparent evolutionary significance in separating and interpreting the groups within the taxon. Two suites of characters, one correlated with nototribic and the other with sterno-tribic pollination, provide the bases for recognition of two major sections in the current revision of *Dicerandra*. One section is represented by *D. odoratissima* with a gullet-shaped corolla, hood and inserted stamens and the other by *D. linearifolia* with a geniculate, funnel-shaped corolla, standard and exserted stamens. Results of caging experiments indicate that *D. cornutissima*, *D. frutescens* and *D. odoratissima* are obligate outcrossers and completely self-incompatible; *D. densiflora*, *D. linearifolia* and *D. radfordiana* show a slight tendency to self, 2.6%, 0.7% and 0.9% respectively and, in self-compatibility tests when pollen is manually transferred, those figures rise to 2.8%, 3.0% and 5.2% respectively. The data support the conclusion that the spur is a trigger mechanism which must be hit for pollen release and suggest that there is a critical adaptive relationship between spurs of *Dicerandra* species and their entomophilous pollinators, and, further, that diagnostic micro-characters relating to spurs and stamens are of importance in interpreting the systematics of this group. Field investigations suggest adaptations to a wide range of pollinators, with an apparent tendency toward exclusivity, such as psychophily in *D. radfordiana*, in peripheral range groups.

HUEY, DAVID W. and THOMAS L. BEITINGER. Louisiana State University at Alexandria, and North Texas State University--MS-222 induced methemoglobinemia in channel catfish.

Induction and turnover of methemoglobin (MHb) was measured in juvenile catfish, *Ictalurus punctatus* exposed to 70 mg/L tricaine methanesulfonate (MS-222). Methemoglobin concentrations (g %) were highly significantly related ($p < 0.01$) to time during both exposure and recovery. During 40 min exposures the best fit regression model for MHb development was MHb (g %) = $0.186 + 0.012 \text{ min}$. A best fit recovery model of MHb = $0.363 - 0.002 \text{ min}$ was found for previously exposed catfish placed in MS-222 free water. After 90 mins of recovery, MHb concentrations were not significantly different from controls. These results suggest that at 25°C, possible negative effects of MS-222 induced methemoglobin can be avoided if test fish are allowed at least an 1.5 h recovery period.

HYLTON, ROBERTA E. Tennessee Technological University--The biological effects of bank stabilization structures on fish in Fort Loudoun Reservoir.

Individuals owning shoreline property on reservoirs regulated by the Tennessee Valley Authority and the U.S. Army Corps of Engineers are required to obtain a construction permit before installing any type of bank stabilization structure. A study was begun on Fort Loudoun Reservoir, Tennessee, during April 1982 in order to provide a scientific basis for permit review and to fill the paucity of information dealing with the biological effects of stabilization structures in freshwater, lacustrine environments. Three types of habitats: retaining walls, riprap, and natural shoreline, were comparatively examined for differences in species composition, relative abundance, and densities of fish populations. Fish populations were sampled biweekly by electroshocking from the three habitat types during May through October 1982 and by shoreline rotenone applications during August through September 1982. A stomach content analysis was conducted on *Micropterus dolomieu*, *Micropterus salmoides* and *Lepomis macrochirus* collected by electroshocking. Preliminary results indicate riprap structures provide suitable habitat for many species of fish while retaining wall structures tend to adversely impact the aquatic environment. In some cases the installation of riprap results in changes in species composition, relative abundance and densities of fish by increasing the area of available habitat, increasing the amount of cover and by alteration of substrate type.

IRELAND, PATRICK H. Radford University--Tagging larval salamanders.

This paper describes two new tagging techniques that when used in conjunction with

each other mark individual salamander larvae from hatching through transformation. Recently hatched larvae were tagged with fluorescent pigments, suspended in a solution of 25% mineral oil, 10% DMSO, 0.5% NaOH, and 64.5% water. The pigments were applied with a paint spray gun operated at 45 lbs/in² air pressure. The resulting mark was detected by placing larvae in a dark box illuminated with an ultraviolet lamp. The mark was visible on all larvae for at least 65 days. Larger larvae, 60-65 days post hatching, were retagged with a thin paste of congo-red and DMSO (dimethyl sulfoxide). A 1 mm incision was made on the lateral aspect of the tail just posterior to the hind limbs. The skin was reflected, the superficial muscle teased, and the paste was applied to the wound. The lesion was then sealed with cyanoacrylate (Super Glue). Within 15 days the congo-red was incorporated into the skin and muscle tissue resulting in a diffuse spot that remained visible throughout the remaining larval period and through transformation.

JACKSON, JAMES F. and STEPHEN H. SHIVELY. University of Southwestern Louisiana--A distinctive population of *Cratemys pseudogeographica* from the Calcasieu River system.

Populations of *Cratemys pseudogeographica* from the Calcasieu drainage of southwestern Louisiana differ in several characters from conspecific populations in other drainages of the Gulf Coast. The iris is darkly pigmented, so that the eye appears black. Medial and lateral chin spots are elongated parallel to the curve of the mandible and are frequently connected to form a continuous shallow V-mark. The number of light-colored lines on the head is low. The postorbital crescent is wide. In several characters, *C. pseudogeographica* from the Calcasieu drainage are more similar to *C. pulchra* than are any other populations of *C. pseudogeographica*. The similarity is discussed in light of the age of the Calcasieu River system.

JACKSON, JEROME A. Mississippi State University--Range expansion of the armadillo (*Dasypus novemcinctus*) in the mid-south.

The armadillo has been expanding its range eastward and northward from south Texas populations since the early 1900's. Previous studies have documented the species in the mid-south as far north as Memphis, Tennessee, east to east-central Mississippi, and all along the northern Gulf Coast. This study provides documentation for the species in several new areas. At present the north-eastern limits of distribution seem to be northeastern Mississippi (Itawamba County) and west-central Alabama (Pickens and Tuscaloosa counties). Factors influencing the species distributional changes will be discussed.

JACKSON, LYNDA F. Howard University--The effects of siderophores on the circadian rhythm of *Neurospora crassa*.

An attempt was made to study the effects of siderophores on the circadian rhythm of *Neurospora crassa* and its mutants. Nine mutants were grown on Vogel's medium, supplemented with 2% sucrose, which was sterilized and solidified in 35cm race tubes, to establish their rhythm. The mutants utilized included Alcoy, bd, Timex, E₃, Clock, cl, and a series of frqs (1,2,3,7, wild type). *Neurospora crassa* mycelia were obtained by growing conidia for 48 hours in aerated liquid Vogel's media at room temperature. Siderophores were then isolated and partially purified on XAD-2 and BioGel-P2 chromatographic columns following hydrochloric acid, ethyl alcohol, and lead acetate precipitations. The mutants were then placed on siderophore supplemented Vogel's minimal medium, the rhythms were accessed and compared with the already established rhythms. A siderophore uptake mutant was independently crossed with Clock and Timex E₃, strains which show distinct rhythmic patterns, to determine the rhythm pattern of any double mutants. The effects of siderophores on the circadian rhythm of *Neurospora* will be discussed. The study was designed to provide information about the genetics involved in the regulation of circadian rhythms.

JACOBS, BRIAN F., CHARLES R. WERTH, and SHELDON I. GUTTMAN. Miami University--Genetic Relationships in *Abies* (fir) of the Eastern U.S.: an electrophoretic study. *Abies* (fir) is represented in the eastern U.S. by two alleged species, *A. balsamea* and *A. fraseri*, distinguished by relative cone bract to subtending cone scale lengths and number of leaf hypodermal cells. Intermediate individuals have been recognized as *A. balsamea* var. *phanerolepis*. The origin of this intermediate form, whether hybrid or (merely) sub-specific, is indicative of the relationship between the two alleged species during the last 18,000 years and forms the basis for two alternative hypotheses. Measures of genetic distance between populations and taxa representing eastern U.S. *Abies* were generated from electrophoretic analysis of 20 gene loci. All populations and taxa shared similar complements of alleles at comparable frequencies for 13 polymorphic loci. These data do not support specific distinctions within eastern U.S. *Abies* and suggest the intermediate form is not of hybrid origin. Our results are consistent with those of recent studies and support the hypothesis that *A. fraseri* and *A. balsamea* are only recently (18,000 years to present) derived taxa.

JAECER, ROBERT G. University of Southwestern Louisiana--Territorial behavior of terrestrial salamanders.

Terrestrial salamanders of the genus *Plethodon* exhibit characteristics of territoriality. (1) They spend long periods of time at the same site. (2) They advertise these sites with individually unique pheromones. (3) They

defend such sites aggressively against intruders. (4) In most cases, defenders are able to expell intruders from the defended site. Present evidence indicates that these territories serve mainly to defend a scarce supply of invertebrate prey, although recent evidence suggests that territorial defense may also be involved in courtship. A unique set of combat tactics are utilized during territorial contests.

JOHNSON, SANDRA STRAWBRIDGE AND SHARON PATTON. University of Tennessee--Serological survey for Toxoplasma antibodies in raccoons of Cades Cove, Great Smoky Mountains National Park, Tennessee.

Toxoplasma gondii is the causative agent of toxoplasmosis, a protozoan zoonosis found throughout the world. Cats of the family Felidae are the only known definitive host for T. gondii; however, a wide variety of animal species is susceptible to infection as intermediate hosts. In conjunction with an ecological study of raccoons in Cades Cove, Great Smoky Mountains National Park, blood was collected to be screened for antibodies to Toxoplasma. Serum was separated from the blood samples and stored at -70°C until analyzed by indirect hemagglutination. From October 1981 - October 1982, 91 sera were tested; 38% of the samples from female raccoons and 41% of the samples from male raccoons were positive.

JONES, JON D. Soil Conservation Service--Influence of oaks on the accumulation of calcium in forests.

Nutrient cycling studies have shown that oaks generally are rich in nutrients and that some species accrue exceptionally high levels of Ca in certain tissues. Thus the question arises, to what extent does the presence of oaks affect the Ca nutrient structure of various forest types? A study of two oak-hickory forests on loessial soils in the Ozark Hills region of southwestern Illinois showed that tissues and oak species varied considerably in amounts of Ca accumulated. Calcium content of Q. alba tissues varied from 12 kg/ha in foliage to 501 kg/ha in stem bark. Stem bark Ca represents 82% of the Ca reserves in Q. alba but only accounts for 16% of its above-ground biomass. The amount of Ca, as a percent of a species total mass, ranged from 1.3% for Q. alba to 0.6% for Q. rubra while the value for Liriodendron tulipifera was as low as 0.2%. The Ca nutrient structure of different forest types will be discussed in relation to the presence or absence of Quercus spp. Partially funded by McIntire Stennis Cooperative Forestry Research Program (FY 83).

JONES, SAMUEL B. The University of Georgia--A synoptic view of the Compositae genus Vernonia.

Vernonia, the largest genus in the tribe Vernoneae, encompasses almost 1,000 species.

Although the genus is best represented tropically, Vernonias are found in a wide variety of habitat regimes ranging from subtropical cloud forests to seasonally dry plains and fire savannas, from marshes and other wet areas to xeric sites, and into the temperate frost-prone regions of eastern North America. Many species range widely and may extend throughout a continent; others are narrow endemics. Annuals, herbaceous perennials, trees, shrubs and a few lianas reflect the extensive radiation of this group. As a result, relationships within this taxonomically complex genus are difficult to fully comprehend. After over twenty years of research in the field, greenhouse and laboratory, our knowledge of the genus is far from complete. However, investigations which deal with field and herbarium observations, chromosome number determinations, hybridization experiments, garden experiments, herbivore interactions, exomorphology of the pollen and other structures, and biochemical systematics have enabled us to better understand this remarkable and complex group of plants. The problems are formidable since the genus is largely tropical and access to populations is often difficult.

KOGUT, MICHAEL H. and PETER L. LONG. University of Georgia--Extraintestinal sporozoites of Eimeria of the chicken.

Two well established aspects of the biology of the host-parasite relationship of Eimeria are their hosts and site specificities. We have previously shown that Eimeria will grow in foreign hosts treated with silica particles suggesting a role for macrophages in host specificity. Other studies indicate that some sporozoites of Eimeria reach sites other than the intestinal in both homologous and heterologous hosts. These extraintestinal sporozoites do not develop further but retain their viability and infectivity for up to 7 days after inoculation. We now report the presence of sporozoites of Eimeria necatrix in the peripheral blood of experimentally infected turkeys. In a blood smear taken from a turkey 3 days post-inoculation, we have observed a number of intracellular sporozoites within granulocytes. We believe that extraintestinal sporozoites are carried in the blood to other organs of the host. How these sporozoites get into the circulatory system from the intestine is not yet known. Macrophages may carry these sporozoites to the blood as a means of rejecting foreign Eimeria from a heterologous host. Recent findings indicate that intraepithelial leukocytes (IELs) may be responsible for the transport of sporozoites in homologous hosts. Studies are being done to confirm the role of these cells in the transport of sporozoites from the intestine to the circulatory system and extraintestinal sites.

KYLE, DENNIS E. and GAYLE P. NOBLET. Clemson University--Isolation of thermotolerant Acanthamoeba from South Carolina piedmont lakes.

Selective cultivation at 45 C of amoebae strains isolated from three lakes in the

South Carolina piedmont resulted in the collection of thermotolerant Acanthamoeba. In two lakes, these small free-living amoebae were isolated from shallow (0.2-0.6 m) and deep (4-6 m) sediment samples; none were obtained from surface water samples. Acanthamoeba from the third lake were isolated from the microstratification layer of organic particulate material in both the epilimnion and the thermocline. Identification of isolated amoebae was accomplished by examination of selected isoenzyme patterns produced by agarose isoelectric focusing in addition to trophozoite and cyst morphology. Since thermotolerance often is associated with potential pathogenicity, virulence of isolated strains was examined by intranasal and intracisternal inoculation of amoebae into weanling Swiss mice (KM3(SW)BR).

KYLE, DENNIS E. Clemson University--
Larval aporocotylid digenetic trematodes
in polychaete annelid hosts.

Two terebellid polychaetes, Amphitrite ornata and Enoplobranchus sanguineus, were found to be first intermediate hosts for larval digenetics of the family Aporocotylidae. Fully mature cercariae observed from sporocysts in the coelom of A. ornata or E. sanguineus were aphyaryngeate and monostomate. The anterior tip of the cercariae was encircled with six parallel rows of minute spines around a terminal mouth. The penetration organ encircled the mouth and contained the distended ends of ducts from gland cells. The gland cells were arranged laterally in five pairs along the length of the body and centrally as a cluster of four glands in the anterior third of the body. A simple esophagus led to two ceca near the midbody region. Approximately 50 cercariae developed in the spherical to slightly oval sporocysts. More than one generation of sporocysts were found in the coeloms of the polychaetes. Rediae, found only in E. sanguineus, were elongate, with a tapered posterior end and a mouth at the more rounded anterior end. The terminal mouth opened into a doliiform pharynx which led into a large, simple sac-like cecum. Immature cercariae from rediae were aphyaryngeate and monostomate with an unforked tail. Cercariae from sporocysts or rediae in A. ornata or E. sanguineus differ significantly from previously described species of Aporocotylidae by the absence of a forked tail and finfolds on the body or tail.

LASALLE, MARK W., ARMANDO A. DE LA CRUZ and GARY L. MILLER. Mississippi State University--Energy Lost to Exuviae During Molting for *Lycosa* sp. (Lycosidae).

The loss of carbon compounds during molting, in the form of the discarded exuviae, was determined. The loss of material was expressed as a percentage of the total weight of the spider. Discarded exuviae from 20 spiders, ranging in carapace width from 1.3 to 4.7 mm, were collected. Exuviae mass ranged from 0.18 to 5.4 mg dry weight and constituted from 4.4 to 10.6 % of total

weight of spiders. The amount of material lost increased with spider size indicating greater loss in later molts. The caloric content of exuviae was 8.74 ± 2.27 cal/mg dry weight. Over the range of spiders studied this loss of carbon represents between 1.57 and 47.2 cal per molt.

LEE, MARTHA, JAMES H. HORTON,¹ and GARRETT A. SMATHERS.² Western Carolina University¹ and National Park Service²--Reproductive Studies of *Parnassia asarifolia* Vent.

Parnassia asarifolia, a southeastern endemic, is a perennial herb inhabiting bogs and seepage slopes. The reproductive biology of this species is not adequately described in the literature. Previous arguments include both autogamy and xenogamy as pollination mechanisms. This species has been studied using a systematic approach to species biology and emphasizing systems of reproduction and establishment.

LEMAITRE, RAFAEL. University of Miami--Decapod crustaceans from Cay Sal Bank, Bahamas, with notes on their zoogeographic affinities.

During a biological investigation of Cay Sal Bank in 1978-82 conducted on R/V "Bellows", 118 species of decapods were collected in depths ranging from the surface to 540m. The material obtained included the heretofore figured but undescribed caridean Stylo-dactylus rectirostris A. Milne Edwards, and the poorly known brachyurans Dissodactylus juvenilis Bouvier and Micropanope pusilla A. Milne Edwards. First western Atlantic records are reported for the carideans Ligur ensiferus (Risso) and Plesionika williamsi Forest, and minor range extensions for six other species. The zoogeographic affinities of the species are greatest with the fauna from the Antilles and/or Bahamas; however, strong affinities are observed with the fauna from the Gulf of Mexico. Distribution data indicates that the Florida Current is not a very effective barrier for decapod crustaceans and more likely serves as vehicle for the transport of larval stages across the Straits of Florida. Some penaeoids and carideans from the bank have strong affinities with the eastern Atlantic fauna.

LEWIS, ROY R., III. Mangrove Systems, Inc.--Mangrove forests of the southeast United States.

Mangrove forests in the United States are composed of three dominant tree species: Rhizophora mangle L., Avicennia germinans (L.) Stern and Laguncularia racemosa Gaertn. f., that often intergrade with tidal marshes dominated by Juncus roemerianus Scheele and Spartina alterniflora Loisel. Mangrove forests are largely limited to areas south of 30

N latitude, although periodic frosts and freezes keep forests north of 28° N latitude at shrub stature. There are an estimated 162,000-219,000 hectares of mangrove forests in Florida and an unknown much smaller amount scattered along the northern Gulf of Mexico. These areas are well documented as unique habitats for several dozen invertebrate species, as important nursery habitat for many juvenile fish and shellfish species utilized in commercial and recreational fisheries, and as critical feeding and nesting habitat for wading birds and shorebirds. Significant losses of mangroves due to man's activities (-44% in Tampa Bay, Florida and -82% in Biscayne Bay, Florida) have resulted in declines in harvestable and recreational resources. Efforts towards reversing these are described.

LIBERATOS, JAMES D. and ROBERT B. SHORT.
The Florida State University--
Identification of sex in schistosoma
larval stages.

Identification of sex of *Schistosoma mansoni* cercariae was accomplished by treating them by a C-banding technique. The tail nuclei showed sexual dimorphism in that females exhibited W-chromatin corresponding to the large block of heterochromatin of the W chromosome, and males did not. This dimorphism was also seen in nuclei of male and female sporocysts and adults of *S. mansoni*. Similar dimorphism was also seen in nuclei of miracidia, but the sex was not confirmed. No sexual differences were observed in cercarial nuclei, after C-banding treatment, of *S. haematobium*, *S. japonicum*, or *Schistosomatium douthitti*. By conventional Giemsa staining no sexual differences were seen in any larval stages of the above species. This is a reliable and fairly rapid technique for sexing *S. mansoni* cercariae.

LINDSAY, DAVID S. and WILLIAM L. CURRENT.
Auburn University--The in ovo development
of Isospora suis.

Development of the swine coccidium *Isospora suis* in embryonated chicken eggs is described. Approximately 200,000 sporozoites were inoculated into the allantoic cavity of 10-day-old embryonated chicken eggs. Allantoic fluid (AF) and portions of CAM were examined at 24-hour intervals for the presence of living stages of *I. suis*. At 24 and 48 hr PI sporozoites were the only stages present in the AF and no stages were observed in the CAM. By 3 and 4 days PI, binucleate Type I meronts and Type I merozoites were present. Type I meronts underwent repeated divisions by endodyogeny and produced up to 12 Type I merozoites within a single host cell. Type I meronts and merozoites were still present 8 days PI. Multinucleate Type II meronts and Type II merozoites were first seen in AF and CAM 5 days PI. Type II meronts were often seen in groups of 2-4 per host cell and produced up to 26 Type II merozoites per host cell. Young sexual stages were seen 6 days PI and mature unsporulated oocysts were first seen 8 days PI. The endogenous development of *I. suis* observed *in ovo* is similar to that occurring in experimentally infected piglets.

This study represents the first fully documented report of complete development of any mammalian coccidium in chicken embryos.

LUCAS, BILL and DAN K. EVANS. Marshall University--A biosystematic comparison between Polemonium reptans L., P. reptans L. var. villosum Braun and P. vanbruntiae Britt. in the eastern United States.

Three taxa of *Polemonium* are distributed in the eastern United States: *Polemonium reptans* L., *P. reptans* L. var. *villosum* Braun and *P. vanbruntiae* Britt. The taxonomic status of *P. reptans* var. *villosum*, a federally proposed threatened species, has been questioned. Four populations each were selected from *P. reptans* and *P. reptans* var. *villosum* in southeastern Ohio and West Virginia. Some herbarium material was used. Preliminary chromosome counts indicate a haploid number of 9 ($n = 9$) for both *P. reptans* and *P. reptans* var. *villosum* while *P. vanbruntiae*'s tentative haploid number is 18 ($n = 18$). Thirteen characters were analyzed by stepwise discriminate and principle component analysis. A continuum was noted between *P. reptans* and *P. reptans* var. *villosum*. However, F-values derived from discriminate analysis showed significant differences between *reptans* and *villosum* populations. When key variables are graphed using the hybrid indices a striking distribution pattern, indicative of hybridization, can be seen.

MACKENZIE, MARK D.^{1,2} and PETER S. WHITE¹.
Great Smoky Mountains National Park¹, and University of Tennessee² -- Woody vegetation of the Great Smoky Mountains based on data collected in the 1930's.

Between 1935 and 1938 Frank H. Miller directed an analysis of the forest types within the then newly aquired Great Smoky Mountains National Park. Miller and his crews collected vegetation data from 1378 .08 ha plots. The plots ranged from 305-2024 m in elevation and spanned the entire moisture, disturbance and geographic gradients in the Smokies. These plots represent the only survey ever done of the entire Park. Miller used these plots to construct a vegetation map of the Park. The data were never quantitatively analyzed and lay undiscovered in the National Park archives for 40 years. As part of a project to model successional change in the Smokies and to evaluate Whittaker's widely known paradigm of southern Appalachian Mountain vegetation, these plots were summarized quantitatively and analyzed via various multivariate techniques including classification and ordination.

MACLEISH, NANDA F. F. University of Georgia--Systematics of Eremanthus Less. and related syncephalous Vernoniace genera.

Eremanthus Less. (Compositae:Vernoniaceae) has traditionally comprised syncephalous herbs,

shrubs and trees restricted to the Central Brazil Plateau of South America. The systematics of Eremanthus has not been reevaluated since Baker (1873); a comparison of Baker's treatment with those of De Candolle (1836) and Schultz-Bipontinus (1861, 1863) suggests a less than optimal understanding of generic and specific boundaries within these species' groups. Comprehensive investigations utilizing anatomical (trichomes, florets and achene), cytological and palynological data sources supports the polyphyletic origin of Eremanthus proposed by some authors - principally, De Candolle. Thus, the genera Notholochnophora N. MacLeish, Chresta Vell. Conc., Pycnocephalum DC., Argyovernonia N. MacLeish, Prestelia Schultz-Bip., and Glaziovianthus G. Barroso are segregated from Eremanthus; however, as originally proposed by De Candolle, the genus Vanillosmopsis Schultz-Bip. has been incorporated into Eremanthus. In addition, the monotypic status of Albertinia Sprengel, Blanchetia DC. and Pithecoseris C. Martius ex DC. is supported.

MARIS, ROBERT C. Old Dominion University
--Larval distribution of porcellanid crabs
(Decapoda, Anomura) in the northern Gulf
of Mexico.

Distributions of zoea I and II larvae of Eucramus praelongus Stimpson, Petrolisthes armatus (Gibbes) and Polyonyx gibbesi Haig, in four island passes bordering Mississippi Sound, were studied according to season, depth, temperature, salinity and dissolved oxygen. The mean density for 96 samples (collected from October 1973 to September 1974) was 7 zoeae per 100 m³ (range 0-2871). Zoeae of E. praelongus comprised 92.82% of the total catch, with 1.97% of P. armatus and 5.21% P. gibbesi. Zoeae I of E. praelongus were collected in larger numbers than zoeae II (1:1.1, $\chi^2 = 29.06$, $p < 0.001$) possibly indicating nearby breeding adults. Zoeae II of P. armatus and P. gibbesi were found in greater abundances than zoeae I (1:2.5, $\chi^2 = 32.50$, $p < 0.001$; 1:1.4, $\chi^2 = 14.06$, $p < 0.001$, respectively) which might signify extensive larval drift from populations at distances from the collection sites. All three species apparently exhibited bimodal breeding cycles with larval peaks in April-May and August-September. Larvae of each species were much more abundant in bottom (90.63-99.23%) as compared to surface samples, which possibly aids in larval retention and recruitment to adult populations. A significant positive correlation was found between zoeae II of P. armatus and temperature. Significant inverse correlations were noted between dissolved oxygen and zoeae II of P. armatus, zoeae I and II of P. gibbesi. No significant correlations between zoeae and salinity were observed. Best multiple regression equations were calculated with consideration for all known independent variables.

MARTIN, DAVID L. University of Southwestern Louisiana--Combat behavior in snakes and the sexual rivalry hypothesis. In snakes, aggressive behavior between males takes the form of highly ritualized sequences

in which each male attempts to throw the opponent off balance. This combat behavior is remarkably consistent among the snake families. Although the function(s) of combat remain unclear, it has long been suggested that it is an expression of sexual rivalry. This hypothesis has been questioned because in many instances in which combat has been observed, no female is apparent nearby. However, this can be accounted for by a knowledge of snake sexual behavior and the application of parental investment theory. Since males have virtually no post-copulatory investment in their offspring, a male can maximize his fitness primarily by mating with as many females as possible during the restricted mating season. Thus male sexual behavior can be envisioned as essentially a race to inseminate females. Since snakes have well-developed trailing abilities, a male that excludes other males from a female's trail is much more likely to reach, court, and copulate with that female first. Thus males may often combat to determine retention of a female's trail.

MARTIN, DAVID L. University of Southwestern Louisiana--Home range and movements of the cottonmouth, Agkistrodon piscivorus, in southern Louisiana.

Movements of cottonmouths were monitored by radio tracking near the edge of a small lake near the western border of the Mississippi floodplain. Home range sizes ranged from 0.15 to 1.97 ha, considerably smaller than those reported for a number of colubrids. Home range size was unrelated to either snake length or number of recorded positions. It was significantly correlated with mean time of observation, decreasing from summer to winter curvilinearly. Home ranges were generally found to be elongate, with their long axes perpendicular to the shoreline of the lake. I hypothesize that this shape is related to the generalized feeding habits of this species, and that each individual maximizes its range of potential prey in this way. Individuals showed some familiarity with their home ranges, occasionally returning to specific locations over periods of 2-7 days. No seasonal pattern of directionality was noted, and individuals seemed opportunistic in their selection of hibernacula. Daily movement rate was significantly correlated with time of year, decreasing from summer to winter linearly. Movements became increasingly punctuated from summer to winter. Time since last rainfall was also negatively correlated with movement rate.

MARTIN, WILLIAM H. and HARVEY L. RAGSDALE. Eastern Kentucky University, and Emory University--The role of vegetation mapping in environmental assessment.

Usually, environmental assessments of public projects produce lists of higher plants and animals coupled with some general statements of environment and vegetation that can be gleaned from literature and determined from casual reconnaissance. Environmental

assessment of the site of a proposed synfuel demonstration plant at Newman, Kentucky (SRC-1) has emphasized a different terrestrial ecosystem component as a starting point--the vegetation. Evaluation of vegetation of this site and surrounding area involved (1) ground and aerial (helicopter) reconnaissance, (2) evaluating existing imagery, (3) sampling natural vegetation and establishing permanent plots concurrent with (4) obtaining low-altitude infrared imagery at different scales. We recognized and mapped six distinct natural vegetation types by sampling, nine general vegetation/land use categories by imagery, and identified a fragile area that will require special monitoring. Different wildlife habitats, noted in the field and from imagery, were incorporated into the final result, the vegetation-habitat reference map. We assert that the vegetation of a project area is the first biological feature that should be assessed because it is an ecosystem component that adequately integrates the biota and environment.

MASSEY, JIMMY R. University of North Carolina, Chapel Hill--Nutlets, achenes, and schizocarps. What kind of fruit does a Maple have?

The commonly used classification systems of dry indehiscent fruit types are generally too broad or simple, too taxonomically biased, or too carelessly and erroneously applied. A comparison of definitions, as well as present and historical applications of the terms, suggests that an improved system is needed and may be made using many of the same basic types but with appropriate modifiers. Several fruit types, such as nutlets or samaras might best be used in a much more precise manner, used as a modifier, or placed in synonymy under existing types. A modified or modern system should better serve the needs of systematists.

MATTHEWS, M. MELISSA and DARRYL L. FELDER. University of Southwestern Louisiana--Phylogenetic distribution and variation of a dactylar locking mechanism within brachyuran Crustacea.

Some members of the Infraorder Brachyura possess what is referred to as a skeletal locking mechanism at the articulation of the propodus and dactylus on some or all of the posterior pereopods. This locking mechanism was initially observed among certain members of the Dromiacea and the Oxyrhyncha. Various degrees of lock development have now been observed in other representatives of both brachyuran and nonbrachyuran Decapoda. SEM and LM investigations indicate variations in lock design among the members of the subfamilies Acanthonychinae, Inachinae, Majinae, Mithracinae, Ophthalmiinae, Oregoniinae and Pisinae of the Majidae. Presence and absence of the lock can occur within these subfamilies. Pereopod measurements indicate a correlation between dactylar, propodal length and breadth and development of the locking mechanism. The presence or absence of the locking mechanism appears to be the result of convergent evolution.

MCBRIDE, STEVE and DONALD TARTER. Marshall University--Food habits of the sauger, *Stizostedion canadense*, from the Gallipolis Locks and Dam, Ohio River mile 279.

The Food habits of sauger, *Stizostedion canadense* (Smith), from the Ohio River at the Gallipolis Locks and Dam, were studied from March 1981 through April 1982. A total of 151 sauger was collected and their stomach contents analyzed for food categories. Seventy percent of the stomachs contained food. Fishes were the primary food of sauger both by weight (99.7%) and frequency of occurrence (100%). Emerald shiners, *Notropis atherinoides*, and gizzard shad, *Dorosoma cepedianum*, comprised 96% of all identifiable food items. Emerald shiners were the most important food item by number, occurring in 49% of stomachs that contained food, and by weight making up 32% of food biomass. Terrestrial and aquatic invertebrates were of minor importance in the diet. Seasonal variation in sauger feeding was minimal, as was variation in feeding of adult sauger of different lengths. Sauger appeared to feed most intensively in the fall. Regression analysis of the relation of sauger catch and water temperature showed a significant negative correlation ($r = -0.87$).

MCCONAUGHA, J. R., R. C. MARIS, D. F. JOHNSON, and A. J. PROVENZANO. Old Dominion University--A descriptive model for offshore dispersal of larval blue crabs (*Callinectes sapidus*) and reinvasion into the lower Chesapeake Bay, Virginia.

An extensive four-year quantitative sampling program has been conducted in the waters around Chesapeake Bay. Results indicate that newly hatched first stage zoeae of the blue crab are concentrated within the upper one meter of the water column. This distribution insures entrainment of the larvae in outwardly flowing ebb tides leaving the bay mouth. All seven later zoeal stages and the megalopa are also found predominantly in the neuston or upper one meter. Up to 99% of stage I larvae and more than 70% of all stages were found above one meter. No evidence of any vertical migration was obtained. The near surface distribution makes the larvae very susceptible to surface effects and wind-driven currents. Recent evidence suggests that during the peak spawning period of summer, a wind-generated countercurrent is produced on the continental shelf. This counter flow prevents larval loss via the southward flowing longshore currents. The width and speed of the counter system are related to wind direction and velocity. Larvae within the countercurrent are eventually returned to near Chesapeake Bay for contribution to recruitment. Three transects have been regularly sampled at 10 mile intervals to 50 miles offshore. Maximum concentrations of larvae have consistently been found in a band 20-30 miles offshore. A further transect from Norfolk, VA to Annapolis, MD, sampling at 10 mile intervals, has proven that insignificant numbers of larvae are found within the bay to support recruitment by retention mechanisms. This work was supported by the Office of Sea Grant, NOAA, U.S. Department of Commerce, under grant no. NA81AA-D-00025 and the Virginia Sea Grant Program through Project No. VMSC 81-1185-761.

MCDUGAL, KAREN M. AND C.R. PARKS.
University of North Carolina at Chapel
Hill--Geographic distribution of
flavonoid chemotypes of red oak,
Quercus rubra L.

Red oak, *Quercus rubra* L., is a widely distributed forest tree of eastern North America. It is rich in flavonol glycosides, especially myricetin and quercetin pentosides. Two chemical forms of red oak occur in the southern Appalachians which differ in their foliar flavonoid profiles and elevational distribution. Low elevation trees synthesize primarily quercetin glycosides while those at high elevations also produce myricetin glycosides. Trees with reduced levels of the latter occur at mid elevations. Using HPLC we have obtained quantitative data on populations from over the species range. These indicate that red oak chemotypes and the degree of population heterogeneity are correlated with latitude and longitude as well as elevation. Myricetin-rich individuals occur primarily along the Appalachian range and at high latitudes. South and west of the mountains populations are highly heterogeneous and contain both myricetin and quercetin-producing individuals although the myricetin profiles in this area are reduced and similar to those at mid elevations in the mountains. Quercetin-rich trees are found at low elevations east of the Appalachians. Populations in this area, and at high elevations and high latitudes are homogeneous, exhibiting only quantitative variation. From central Alabama to central Indiana and Ohio within-population variability approaches that between populations, with the ability to synthesize myricetin being the major variant.

MCGIMSEY, WILLIAM C. Western Carolina University--Reproductive biology of the mygalomorph spider *Antrodiaetus unicolor*.
Antrodiaetus unicolor is a primitive burrowing spider common in the southern Appalachian Mountains. Sexually mature individuals mate in the autumn months. The adult male dies during the winter while the adult females overwinter within their burrows. Mated females store sperm within cuticular structures called spermathecae until eggs are fertilized and laid in mid-summer. This study was performed to determine the manner in which these spiders store sperm for such an extended period of time. Of primary interest was the role of the spermathecae and the associated spermathecal glands. Spiders were collected for one year, encompassing premated adult females through post-egg-laying females, to obtain specimens for histochemical analysis. Histological techniques employed were fixation in absolute ethanol-glacial acetic acid (3:1), paraffin embedding, serial sectioning and staining. The following stains were employed: Methylene blue, Periodic-Acid Schiff with diastase controls and Feulgen. Preliminary results indicate that glycogen deposits which occur in the spermathecal glands may be involved in sperm maintenance.

MCGUIRE, ROBERT F. University of Montevallo, Alabama--Using numerical taxonomic methods to define the central characteristics of *Nostoc* and *Anabaena*.

From previously published data 46 characteristics of 14 *Nostoc* and 10 *Anabaena* species were analyzed in order to investigate the central characteristics of these two genera. The central or typical characteristics of *Nostoc* and *Anabaena* were compiled by using the most frequent character states of each. A similarity range was constructed to show the relationship of the "typical" *Nostoc* characteristics to the 24 species studied and separately to show the relationship of the "typical" *Anabaena* characteristics to each of the species. A similarity of 64% existed between the two "typical" descriptions. The "typical" descriptions seemed to measure well the central characteristics of each genus. *Nostoc linckia* (Roth) Born. et Flah. had the highest correspondence to the "typical" *Nostoc* characteristics at 94%, while *Anabaena verrucosa* Boye-Pet. had the highest correspondence to the "typical" *Anabaena* characteristics at 98%. *N. linckia* and the "typical" *Nostoc* characteristics would seem to be useful in helping to delimit other possible members of *Nostoc*, and in a similar manner *A. verrucosa* and the "typical" *Anabaena* characteristics would seem to be useful in helping to delimit members of *Anabaena*.

McKINNEY, L. D. Texas A&M University at Galveston--The origin and distribution of the Amphipoda on the submerged banks of the Western Gulf of Mexico.

The Amphipoda of the submerged banks in the western Gulf of Mexico are a diverse component of a typically epifaunal community. Some fifty species of over twenty families commonly occur on these relict bank structures. These species form a significant portion of the amphipod fauna of the western Gulf. The origin of this epifaunal group appears to be greatly influenced by two factors: means of dispersal, and proximity to source. Rafting of adults is a primary dispersal force within this group which lacks the planktonic larvae common in many crustacea. Combined with a net current flow from the Caribbean rafting would provide strong tropical influence. The presence of a number of otherwise tropical families and a predominance of tropical "ecotypes" is indicative of this influence. The surprisingly extensive bank system not only promotes such dispersal but the deeper banks act as recruitment centers for nearshore epibenthic habitats. When environmental stress depopulates the nearshore areas deeper, less affected banks act as a refuge for the less adaptable (i.e. tropical) amphipod species.

MCLEOD, DON. Mars Hill College--The vascular flora of a small southern Appalachian bog-fen.

The vascular flora of a 0.4 hectare (1 acre) bog-fen in Yancey County, North Carolina was

inventoried during the growing season of 1982 as a part of a comprehensive ecological study. Collections were made from the last of June until the middle of October and were supplemented by collections made prior to 1982. The flora of the study area contains over 150 species of vascular plants representing 58 families (32.2% of the families of the Carolinas). The major families are: *Cyperaceae* (10.1%), *Asteraceae* (9.5%), *Orchidaceae* (6.3%), *Rosaceae* (5.7%), *Liliaceae* (5.0%), and *Ericaceae* (4.4%). The flora is a curious mixture of elements with different affinities, including: (1) northern bog, e.g., *Eriophorum virginicum*, *Carex stricta*; (2) northern fen, e.g., *Campanula aparinoides*, *Solidago patula*; (3) southern Appalachian endemics, e.g., *Juncus gymnocarpus*, *Menziesia pilosa*; (4) coastal plain, e.g., *Eriocaulon decangulare*, *Scleria ciliata*; (5) widespread wetland, e.g., *Eupatorium fistulosum*, *Vernonia noveboracensis*; and (6) adventives from the surrounding forest, e.g., *Acer rubrum*, *Nyssa sylvatica*. The major cause for the high diversity in the study area is probably the minerotrophic conditions of the water moving through the fen with a number of bog microhabitats being created by *Sphagnum* buildup. It is probable that some of the floristic elements are relicts of more extensive wetland habitats during the Pleistocene.

MCLEOD, DON and JO ANN CROOM. Mars Hill College--Vegetation patterns and habitat types in a small southern Appalachian bog-fen.

A 0.4 hectare (1 acre) bog-fen in Yancey County North Carolina (elevation 861.5 m - 2800 ft.) was studied to (1) describe the vegetation patterns and (2) correlate these patterns with environmental factors. Presence and percent cover of vascular plants were determined in eleven one meter wide transects positioned across the study area. An analysis of these data led to the establishment of fifteen (2 m x 2 m) stations in which the following data were collected: percent cover of vascular plant species, depth and nature of substrate, pH, Ca and Mg ion concentration, soil temperature, air temperature, and dissolved oxygen. The bog-fen was classified into the following vegetation-habitat types: 1) *Acer rubrum*/*Alnus*-mixed shrubs/*Glyceria melacaria*-*Carex intumescens*/feather mosses; 2) mixed shrubs/*Osmunda cinnamomea*/*Juncus gymnocarpus*/feather mosses...muck; 3) *Hypericum densiflorum*/*Sanguisorba*/*Carex folliculata*-mixed sedges/dry *Sphagnum* hummocks; 4) *Osmunda cinnamomea*/*Filipendula*-*Aconitum*/*Chelone* spp./feather moss hummocks; 5) *Osmunda regalis*/*Solidago patula*/*Panicum dichotomum*/*Sphagnum* hummocks; 6) *Solidago patula*/*Rubus hispidus*/wet deep *Sphagnum*; 7) *Cladium mariscoides*/*Juncus subcaudatus*-*Rhynchospora capitellata*/*Spiranthes*/shallow *Sphagnum*...standing water; 8) *Eriocaulon*-*Juncus subcaudatus*-mixed sedges/*Pogonia*-*Spiranthes*/*Drosera*/*Sphagnum*...stream border. The bog-fen consists of a mosaic of vegetation-habitat types which are correlated to an environmental complex largely controlled by differences in pH, nutrient regime, moisture-substrate regime (especially water movement), and past history.

McLEOD, K. W., T. G. CIRAVOLO, K. C. SHERROD, JR. Savannah River Ecology Laboratory--Fertilization of Pine Forests: Canopy Response.

Loblolly pine forests on the Savannah River Plant have been fertilized at rates of 400 and 800 Kg N/HA by the addition of sewage sludge. Two types of sludge representing aerobic and anaerobic digestion processes were used. The fertilization with anaerobically digested sewage sludge has led to increased elemental concentrations of nitrogen and phosphorus in the throughfall and increased the amounts of needlefall. The response increases with an increase in the fertilization rate. Aerobically digested sewage sludge, which contains a much higher percent of solids and which appears to not have decomposed significantly, has had no effect to date on either throughfall or needlefall. Whether the increased amounts of N and P moving from the canopy to the forest floor will continue to cycle and furnish trees with increased nutrients or be bound and immobilized by the forest floor is as yet unknown, but could strongly effect future productivity.

MCMURTRAY, JENNIFER D. University of Georgia--Hatching success of eggs remaining in loggerhead sea turtle nests partially depredated by raccoons.

Previous studies have assumed that raccoon (*Procyon lotor*) predation on sea turtle nests does not affect the success of the remaining eggs. During Summer 1982, 43 loggerhead turtle (*Caretta caretta*) nests were screened at Canaveral National Seashore, Florida, to exclude raccoons. Twenty-five nests were undisturbed while 18 had been partially depredated before being screened. Mean hatching success for all disturbed nests was significantly different than for undisturbed nests ($\alpha \leq .05$). All undisturbed nests hatched, with a mean success of 88.5 percent. Mean success for all depredated nests was 32.3 percent. In 9 of 18 depredated nests, none of the remaining eggs hatched; mean success for the other 9 nests was 64.7 percent. This indicates that raccoons can greatly reduce turtle production, even when nests are only partially destroyed.

Menendez, Roger J. Florida State University--The vertical distribution of the two forms of *Panopeus herbstii* on oyster reefs in the N.E. Gulf of Mexico.

The adults of the xanthid crab *Panopeus herbstii* obesa and simpsoni forms, both inhabit oyster reefs and exhibit distinct vertical zonations. I sampled juvenile and adult populations on oyster reefs in Oyster Bay, Florida to determine their vertical distributions and factors regulating them. The adult obesa population is concentrated in high intertidal region where they build extensive burrows. The simpsoni form is found in the lower intertidal zone beneath small oyster clumps. The two adult populations only overlap in the mid-intertidal zone where there is a mixture of substrate types found on the high and low intertidal zones.

Juveniles, unlike the adults, do not appear to exhibit a similar zonation pattern. Both juvenile populations were found throughout the three intertidal zones in equal densities. This suggests that the possible causative factors regulating the vertical distribution of the two forms, such as substrate preferences, microhabitat differences, desiccation tolerances, and behavioral interactions, do not affect their distribution patterns until the late juvenile stages.

MERRIAM, ANE D. Florida State University, Director of Water Resources, Institute of Science and Public Affairs--Wetland conservation issues in Florida.

The State of Florida is noted for its abundant and diverse wetland resources. From the Everglades river of grass and coastal mangroves and marshes, located in South Florida, to the cypress and hardwood swamps dotted throughout the state, Florida's wetlands are supported by an abundance of rainfall and moderate temperature regimes. Historical accounts of Florida's development primarily consisted of draining the wetlands for agriculture while both draining and filling occurred for land development purposes. Yet today, Florida is recognized as a leader in the nation regarding wetland protection. The components of the numerous programs designed to protect wetlands include a combination of regulation, planning and land acquisition. The wetland issues for the 1980s in Florida include:

- Florida's response to proposed changes in federal wetlands management program
- setting land acquisition priorities
- wetlands used for water management purposes
- wetlands used for coastal protection and stabilization
- reclamation and restoration of mined wetlands
- wetland research activities

Through the landmark programs of "Save Our Rivers" and "Save Our Beaches", these issues are being dealt with progressively and actively. However, major problems are emerging as a result of the shift in responsibilities and emphasis by the federal and state governmental programs.

Mitchell, Claudia E. and George T. Weaver. Southern Illinois University at Carbondale--Changes in calcium concentrations of foliage and twigs during leaf senescence of Quercus prinus L. in southern Illinois.

Calcium is not usually regarded as a phloem-mobile element, but some studies have indicated its movement in phloem under certain conditions. To determine the trends of calcium movement in *Quercus prinus* L. growing on two potentially nutrient-poor sites in southern Illinois, autumnal changes in calcium concentrations of leaves, twigs, and stems were observed. Samples were collected weekly

during leaf senescence from ten understory trees growing on a steep cherty southeast and loess-covered northwest slope. There were no significant differences in calcium concentration changes between sites. Calcium concentration increased in all tissues during the senescence period. The calcium increase in current year twigs was greater than the increase in leaf tissue. This differential increase in calcium concentrations may indicate an immediate sink for resorbed calcium.

MITCHELL, SANDRA and GARY L. MILLER. Mississippi State University--Habitat characteristics and chorus structure of the green treefrog (*Hyla cinerea*) in a natural pond.

We studied the dynamics of the chorus structure of a group of *Hyla cinerea* in a permanent pond in Hancock County, Mississippi between May and late June 1982. The primary objectives of the study were to determine the relation between the spacing of calling frogs and (1) frog density, (2) vegetation type, and (3) effective vegetation area. Calling frogs were located at night and given a position on a grid which included the entire pond. The height and vegetation type of the perch were noted. Perch height differed between vegetation types and this was related to the average height of the vegetation. The average nearest neighbor distance (NND) differed between vegetation clumps but the minimum NND remained constant. There appeared to be no relationship between the number of frogs calling in a clump of vegetation and the NND.

MITSCH, WILLIAM JR. University of Louisville--Cypress swamps of southeastern United States.

Cypress (*Taxodium* spp.) swamps are found throughout the Atlantic Coastal Plain from Florida to New Jersey and in the Mississippi Embayment from Louisiana to southern Illinois. Specific studies of swamp structure and function will be presented for still cypress domes in north-central Florida, for a riparian cypress swamp in southern Illinois, and for mine-impacted cypress wetlands in western Kentucky. The importance of hydrologic and nutrient conditions on the cypress community will be discussed.

MODLIN, RICHARD F. The University of Alabama in Huntsville--Zoogeography of the *Heteromys* (Mysidacea) in the Caribbean Sea and Gulf of Mexico.

Species of *Heteromys* have a circumtropical distribution, are predominantly benthic and appear to undergo adaptive radiation in an area having a warm thermal structure and a coarse bottom topography. The Caribbean Sea-Gulf of Mexico complex is such a region. Sixteen of the 30 identified species of *Heteromys* are known from this complex.

Three lines of divergence appear to radiate from a widespread, amphi-Atlantic *H. formosa*-like parental stock toward species with extremely specific Caribbean and Gulf of Mexico habitats. This radiation results in an assemblage of sympatric populations. Evolutionary advancement is related to a reduction in spines on select exoskeletal structures, morphological modifications in the male pleopods and the degree of specificity in habitat selectivity.

Moore, John T. and Jerry L. West.

Western Carolina University--

Relationships between suspended solids and trout standing crop biomass and recruitment in selected Western North Carolina streams.

Four Jackson Co, NC streams, Wolf, Mull, Moses and Dick's Creeks, were selected due to their similarity in characteristics and differences in suspended solids loads. All of the streams have native trout populations and, with the exception of Diok's Creek, are located on U.S. Forest Service land. Four suspended solids samples were collected on a biweekly basis with more frequent samples during high discharge. Mean suspended solids loads were 93.09 mg/l, 111.47 mg/l, 329.04 mg/l and 584.04 mg/l respectfully. Fish samples were taken quarterly and a depletion population estimate was used to determine standing drop biomass for both trout and non-trout species. Age structure of the trout populations was also determined. Summer, Fall and Winter fish samples were compared to determine recruitment of young-of-the-year trout, growth and to estimate mortality. Attempts were also made to determine relationships between suspended solids loads and trout standing crop biomass.

MOORE, JULIE H. North Carolina Natural Heritage Program, Department of Natural Resources and Community Development--
Carolina bays: A Southeastern ecosystem in need of research and conservation.

Carolina bays are poorly drained elliptical depressions, oriented northwest to southeast, scattered on the Atlantic coastal plain, with a center of distribution in the Carolinas. While Carolina bays have been recognized in geological literature since 1848, and bay origin the subject of debate by scientists in various disciplines for 40 years, only recently has the wide range in biotic and abiotic parameters been recognized. Relatively little basic research on the bays as ecosystems has been published: one recent bibliography lists 104 papers on the geology and theoretical origin of bays while only 18 dealt with the biota. Carolina bays represent a unique opportunity for research on a wetland ecosystem endemic to the Southeast. Areas in need of research include soils, hydrology, floristics, vegetation patterns, surveys of vertebrate and invertebrate fauna, endemic and/or endangered species. Carolina bay research sites will undoubtedly become scarcer in the near future in the face of

rapid, irreversible alteration by industrial, agricultural, forestry, and energy interests. Time is critical for both researcher and conservationist if the full spectrum of bay diversity is to be documented, understood and protected.

MORREALE, STEPHEN J., JUSTIN D. CONGDON, and J. WHITFIELD GIBBONS. Savannah River Ecology Laboratory--The significance of terrestrial activity in the slider turtle (*Pseudemys scripta*).

It has often been assumed that aquatic turtles are exposed to the highest levels of risk (e.g. predation, desiccation) during periods of terrestrial activity. If we are to understand why turtles move overland, it is necessary to acquire knowledge of the timing and distance of terrestrial movements by juveniles and adults of both sexes. If higher risks are associated with terrestrial movements, then 1) adult males should be terrestrially active more frequently than females, thus maximizing their opportunities for mating; 2) females should be more sedentary restricting terrestrial movements primarily to those related with nesting activity; 3) small body size of juveniles should increase risks associated with movement, therefore their terrestrial activity should be minimal compared to adults. To address these predictions, movement patterns and activity levels of individual *Pseudemys scripta* were studied on the Savannah River Plant near Aiken, South Carolina. Data from various methods of study were used to determine if differences in movement patterns among individual turtles are related to sex, age, or body size and to the reproductive strategies of adults and relative survivorship of each group.

MYTINGER, LINDA. Louisiana State University--Schinus-A superweed strikes the saline communities of Everglades National Park. The integrity of the mangrove communities in Everglades National Park is presently threatened by the invasion of a woody Brazilian escapee - *Schinus terebinthifolius*. Long used as a landscape plant throughout South Florida, Brazilian pepper has made its way out of the backyard and into disturbed sites within many parks and preserves. Until relatively recently, the ability of *Schinus* to invade saline communities was underestimated. Current surveys reveal the proliferation of this exotic in the western coastal mangrove fringe and southern saline prairie. This study was designed to investigate the coastal environmental conditions which affect the germination and growth of *Schinus*--specifically salinity, soil type, and hydrology. Seed dispersal mechanisms and long term viability are also examined to predict the potential invasion of areas disturbed by hurricanes and frost.

NESOM, CUY L. Memphis State University
Geographic distribution patterns among
taxa of the Gerbera group.

The primarily Afro-Asian genera *Gerbera*, *Leibnitzia*, *Uechtritzia*, *Perdicium*, and *Piloselloides* and the primarily South and Central American *Trichocline* and *Chaptalia* compose a readily identifiable natural group of roughly 100 species. One species of *Gerbera* has been identified from South America; one species of *Trichocline* is known from Australia; my studies have shown that a widespread Mexican species traditionally recognized as *Chaptalia*, as well as a previously undescribed endemic of Sinaloa, both belong with *Leibnitzia*, identifying a new example of continental disjunction. Further, a great deal of diversity exists within both *Cerbera* and *Chaptalia*, and based on traditional characters large segments of these taxa appear to be congeneric, maintained solely on a geographic basis.

NEUFELD, HOWARD S. and CLAUDE W.
DEPAMPHILIS. University of Georgia--
Phenology and seasonal water relations of
Aesculus sylvatica Bartram, a small vernal
understory tree.

Aesculus sylvatica, the painted buckeye, is a small understory tree occurring in mature Piedmont forests of the southeast. It is the first woody species to leaf out (mid-March), flower (April) and lose leaves (beginning in June, complete by 1 Sept.). It was hypothesized that this unusual phenological pattern may have arisen because of its carbon and water requirements. To test this, environmental changes and ecophysiological responses of one population in Georgia were followed through a season. Total leaf chlorophyll per unit area increased from March through late May as the canopy closed (from 47% to 8% sunlight), then decreased through August. Chlorophyll a to b ratio dropped steadily from March through August, due mainly to losses of chlorophyll a. Predawn petiole pressure potentials decreased from -0.06 MPa in March to -0.31 MPa in August. Minimum midday potentials ranged from -0.69 to -1.14 MPa with no apparent seasonal trend. Maximum leaf conductances peaked in April (0.65 cm/s), reached a minimum in July (0.30 cm/s), and were closely correlated with percent soil moisture at 25 cm. Visibly senescent leaves had much lower conductances than healthy leaves. This species may avoid interspecific competition for water and light by gaining most of its carbon early in the season prior to canopy closure. Leaf senescence may be related to both light and mild moisture stress. Fruit production probably draws heavily upon stored carbohydrates. Thus, *A. sylvatica* may be a woody analogue to vernal understory herbs.

NIEMEIER, SUE E. and ROBERT A. YOUNG.
Southern Illinois University--Comparison
of soluble amino acid contents in five
populations of *Crotalaria sagittalis* L.
Analyses were made on soluble amino acids of

seeds from five populations of *Crotalaria sagittalis* L. from the eastern half of the U.S. and Mexico. One tenth gram of ground seed was extracted twice in chloroform-methanol-water. After centrifugation and solvent evaporation, the residue was taken up in citrate buffer, and analyzed on a Beckman amino acid analyzer. Total amino acid content was 248.7, 230.6, 103.4, 125.5 and 280.9 ug/g of seed for populations from Iowa, Illinois, South Carolina, Louisiana and Mexico, respectively. Seed from the Mexico population contained the highest levels of serine, proline and arginine. A low level of histidine was present in Louisiana seed while histidine was absent in seed from South Carolina. South Carolina seed contained no methionine. The number of unknown components ranged from 5-12 among the five populations.

NOBLET, GAYLE P. Clemson University--
Transfer of *Leucocytozoon smithi* gameto-
cytes from infected to uninfected turkey
hosts.

Peripheral blood containing gametocytes of *Leucocytozoon smithi* was collected from turkeys infected naturally by continuous exposure to the bite of *Simulium* vectors. Blood (140-180 ml) from individual infected turkeys (4.9-6.3 kg weight) contained initial gametocyte numbers from 13,300 to 22,200 gametocytes/mm³ as determined by white blood cell hemacytometer counts. Gametocytes were isolated from blood by density gradient centrifugation. Recovered gametocytes were suspended in 10-20 ml of sterile balanced salt solution. All gametocytes recovered from one infected turkey were injected into the brachial vein of an uninfected turkey. Two days later, gametocyte numbers/mm³ of peripheral blood were determined for each injected turkey every 4 h during a 48 h period. For purposes of analyses, gametocyte counts for a turkey were expressed as percentages of that turkey's average. Presence of circadian periodicity characteristic of *L. smithi* gametocytes in naturally infected hosts was inferred from least squares fitting of a simple harmonic to these percentages; lack of synchronization of periodicity among turkeys was inferred from fitted phase values. At the end of the 48 h periodicity study, gametocyte numbers were determined once each day until gametocytes were no longer found. Turkey hosts then were killed, blood collected and treated by density centrifugation, and recovered cells examined for the presence of *L. smithi* gametocytes.

O'Bara, Christopher J. and R. Don Estes.
Tennessee Technological University--
Physical, chemical and biological
characteristics of a stream receiving
acid mine and oil field runoff.

The increase in coal and oil production within the state of Tennessee has led to an additional stress on the lotic environment. The West Fork of the Obey River is a prime example of this degradation, receiving both acid mine and oil field runoff. Cobble size, siltation and discharge were studied and correlated with changes in the benthic

macroinvertebrate community. Increases in silt resulting in the blockage of interstitial flow caused a decrease in the species richness, diversity and overall abundance of macroinvertebrates. The fish community was affected by siltation, adverse water chemistry and a lack of food organisms. A dramatic decline in benthic fishes (percids and cottids) was evident in severely affected sections. Water chemistry attributed to these changes include increases in sulfate, iron, manganese, turbidity and specific conductance. Benthic macroinvertebrates tolerant to adverse conditions were the ephemeropterans, Stenonema sp. and Caenis sp.; the trichopterans, Hydropsyche sp. and Cheumatopsyche sp.; and the coleopteran, Stenelmis sp. Members of the families Chironomidae and Simuliidae were abundant throughout the system. Tolerant fish species included the whitetail shiner (Notropis galacturus), the rosefin shiner (Notropis ardens), the northern hog sucker (Hypentelium nigricans) and the longear sunfish (Lepomis megalotis).

O'KELLEY, J. CHARLES. The University of Alabama--Glutamine synthetase and sexual expression in *Chlorococcum echinozygotum* Starr.

Studies on the influence of nitrogen in the growth medium upon sexuality in the green alga *C. echinozygotum* suggest that the glutamine synthetase (GS) level within dividing cells may be critical in determining whether the cell produces gametes or zoospores. GS is a key enzyme in nitrogen metabolism in some procaryotes and there is evidence that GS regulates nitrogen utilization in these organisms by affecting the transcription of genes for nitrogen metabolism. Previous data on the effect of glutamine and other nitrogen sources upon sexuality in *C. echinozygotum* suggest that GS affects sexual expression by modifying the transcription of genes that regulate sexuality. Studies of the GS level in dividing cells of this organism show that there is a negative correlation between GS activity and gamete production. A critical level of GS may exist in these cells; above this level of GS dividing cells produce zoospores and below it they produce gametes. Supported by a University of Alabama Faculty Research Grant.

OLSON, KENNETH R., KIMBERLY B. FLINT and RICHARD BUDDE. University of Notre Dame and Oak Ridge Graduate School of Biomedical Sciences--Vascular corrosion replicas of chemo-baroreceptors in fish: The carotid labyrinth in Ictaluridae and Clariidae.

Anatomical similarities between a pair of highly vascularized tissues found in Ictaluridae and Clariidae and the carotid labyrinth of amphibians suggest that these tissues, the carotid labyrinths, function as chemo- or baroreceptors. These labyrinthine structures arise from the common carotid artery in the dorsal head region of the fish and anastomose with each other to form the internal carotid

artery and several anteriolateral arteries which extend to the anterior head region. Similarities and differences between Ictalurid and Clariid carotid labyrinth structures and techniques used to study the labyrinth (including the vascular corrosion replica technique, scanning and transmission electron microscopy) will be discussed.

OYOFO, BUHARI A. and JOHN E. MAYFIELD. Atlanta University--Effect of cyclic AMP modulating agents on melanin and conidiation in *Verticillium dahliae*.

Verticillium dahliae is an asexual fungus that produces unicellular, mononucleate conidia as its primary means of reproduction and produces melanized survival structures known as microsclerotia (ms). When grown in sucrose-nitrate liquid medium -- a medium favoring conidiation -- microsclerotial production was depressed. Cyclic AMP, dibutyryl-cAMP, caffeine, theophylline, isoproterenol, and propranolol were added to the medium. In order to determine if the agents had a negative influence on melanization they were added to polygalacturonic acid medium (PGAM) -- a medium that induces the synchronized formation of melanized ms. Cyclic AMP and dibutyryl cAMP greatly reduced conidia production over a period of 9 days while isoproterenol had a similar effect which failed to persist after 4 days. Theophylline and caffeine treated cultures did not exhibit any influence on conidiation or melanization. The isoproterenol depression of conidiation was overcome by the addition of propranolol to the medium. Propranolol also reduced or inhibited melanin production in PGAM. The results suggest that those agents which tend to enhance cyclic AMP levels induce conidiation while those which tend to reduce cyclic AMP levels stimulate the production of melanized ms.

PARR, PATRICIA DREYER and FRED G. TAYLOR, JR. Oak Ridge National Laboratory--Effect of fluoride fumigation and acid precipitation on accumulation of fluoride in soil.

Fluoride is the most reactive gas among the major atmospheric pollutants. Although soils may contain high concentrations of fluoride (10-1000 ppm), most is in a form not readily available for plant uptake. In acid soils, however, fluoride is soluble and can be absorbed by the plant. The purpose of this research was to evaluate the combined effect of fluoride fumigation and acid precipitation on fluoride accumulation in a plant-soil microcosm. Swards of fescue grass (*Festuca arundinacea*) were fumigated at the Tennessee state one-week air quality standard (1.6 µg HF m³) 14 hours daily for 12 days then exposed, along with non-fumigated swards, to simulated rain events at 2 pH levels (control and acidic) every 48 hours. Changes in soil water fluoride, total soil fluoride, and soil water pH were determined to evaluate direct effects on soil fluoride dynamics and the potential for plant uptake and deleterious effects. Research sponsored by the Office of Health and Environmental Research, U.S. Department of Energy, under Contract W-7405-eng-26 with Union Carbide Corporation.

Parsons, Keith,¹ Armando A. de la Cruz,² and David L. Stites,³ Georgia Institute of Technology,¹ Mississippi State University² and Emory University³--Insect diversity of a burned and unburned Juncus marsh in Mississippi.

Insect populations were sampled for 11 months in a *Juncus roemerianus* Scheele marsh in St. Louis Bay, Mississippi after the occurrence of midwinter fires. Populations in the unburned control marsh appeared to have an earlier springtime response than did the insect populations of the burned marsh; but later in the growing season the populations in the burned marsh became more diverse and rich. Throughout the study greater numbers of species were generally collected in the burned marsh. Following population crashes in the fall diversity indices remained lower throughout the winter. A maximum of only 32% similarity of species for any given sampling period was demonstrated between the habitats. This, along with the fact that greater numbers of species were usually collected in the burned marsh may indicate different strategies for niche partitioning during regrowth of a *Juncus* marsh following a fire.

PATTON, SHARON, University of Tennessee, College of Veterinary Medicine--Natural transmission of *Capillaria hepatica* to baboons at the Knoxville Zoological Park.

Capillaria hepatica is a nematode parasite that occurs in the liver of rats and other rodents as well as a wide variety of mammals including man. Eggs are not passed in the feces. The female worm deposits eggs in the liver parenchyma where they remain until eaten by a predator or until the liver decomposes after death. The eggs then embryonate in the outside environment. Three baboons at the Knoxville Zoological Park died and were necropsied at the University of Tennessee College of Veterinary Medicine. The liver of all three baboons contained multiple confluent granulomas containing *Capillaria* eggs. In one of the baboons *C. hepatica* was listed as the cause of death. The livers of six other baboons were biopsied and examined for *Capillaria*. *C. hepatica* eggs were found in one of them. The source of infection was unknown. Five rats and 2 mice were subsequently captured at the zoo in the area of the primate colony; one of the rats was actually removed from the hands of a Mandrill baboon. All 5 rats had *Capillaria* eggs or worms in the liver. No evidence of *C. hepatica* infection was observed in the 2 mice.

PECHMANN, JOSEPH H.K., SEMLITSCH, RAYMOND D., GIBBONS, J. WHITFIELD. Savannah River Ecology Laboratory--The drift fence with pitfall traps: a useful technique for studying amphibian and reptile communities.

A drift fence with pitfall traps is one of the best techniques for studying amphibian and reptile communities. Over a four year period, drift fences around two Carolina

Bays in South Carolina have captured 27 of the 30 species of terrestrial amphibians presumed to be present at these sites. Of the 43 species of reptiles that are probably present, 33 have been captured at one of the bays, and 28 at the other. The number of months a drift fence must be run to catch a given percentage of the species present varies considerably with the time of year the study is begun. Continuous, long term monitoring of a site with drift fences is necessary for an adequate assessment of the community. The technique is much more useful for studying some species than others, and its value for several representative species will be discussed.

PENRY, D. L., M. VECCHIONE AND C. L. STUBBLEFIELD. McNeese State University, Lake Charles, LA.--Vertical distribution of sergestid life-history stages in relation to environmental parameters.

The shallow coastal waters of Louisiana are periodically stratified in salinity and dissolved oxygen. The most abundant species of micronekton in these waters are the sergestid shrimps *Lucifer faxoni* and *Acetes americanus*. Our objective was to determine if the vertical distribution of the life-history stages (protozoae, zoeae and postlarvae) of these species changed in response to stratification events. Daytime sampling was conducted monthly from February 1981 through October 1982 along the 10 m isobath off Cameron, LA. A 60 cm bongo frame equipped with a 333 um mesh net was used to collect triplicate surface and bottom samples. *Lucifer faxoni* protozoae and zoeae were bimodal in distribution with peak abundances in early summer and late fall. *Acetes americanus* protozoae exhibited a similar pattern. No seasonal trends in abundance could be identified for *A. americanus* zoeae or for the postlarvae of either species. Although stratification of the water column was observed from late spring through early fall, consistent patterns of vertical distribution could not be identified for any of the life-history stages of either species. For this reason we are reluctant to attribute the mid-summer decline in abundance of both species to stratification, particularly to the anoxia which occurred in the bottom stratum of the water column.

PETERSEN, RAYMOND L., and ARVILLA C. PAYNE-PRICE. Howard University -- Ethnobotanical report on a herbalist of Chatham County, North Carolina.

Until recently modern medicine was not readily available to many rural people. This lack helped to keep alive a now waning ethnomedical tradition of herbalists, midwives, and magico-religious healers. This report examines the work of a practicing herbalist of Chatham County, North Carolina. A variety of plant species employed by the herbalist are discussed both within the context of his plant

classification system and within their preparation and use as herbal remedies. The herbalist's classification system is functional rather than structural. Three major factors of the system are: (1) the relative strength of the herb (effectiveness), (2) whether the herb is powerful (poisonous) or light (non-poisonous), and (3) whether the herb is active or not (rate of reaction or response). The effectiveness of the herbal remedies described is related to information obtained through modern pharmacognosy.

PITTILLO, J. DAN and MARTHA LEE. Western Carolina University--Development of herbarium vascular plant sets.

Traditionally taxonomists collect only flowering or fruiting specimens for herbarium materials. Plant ecologists, species biologists, etc., often are faced with only vegetative plants in the field and need herbarium specimens for verifications. Thus development of plant sets for the herbarium becomes an important undertaking. Plant sets are defined here as various life stages, vegetative forms (stump sprouts, etc.), and reproductive material collected within the same general population during the growing season. Often the collector can obtain several stages at a given site. The additional time and effort to collect sets will be justified by their value to future researchers.

PORCHER, R. D. The Citadel--Natural Diversity in the Francis Marion National Forest.

The Francis Marion National Forest, consisting of 250,000 acres in Berkeley and Charleston counties, S. C., was established in 1936 on an area that had been extensively logged during 1900-36. Today the greater part of the Forest is in sub-climax pine forest that is maintained for timber production. The rest of the Forest harbors a rich diversity of natural areas. A catalogue of natural diversity conducted in 1980-82 lists 45 natural areas recommended for preservation by the Forest Service. The catalogue of natural areas includes rich southern mixed mesophytic forests, pitcher plant bogs, limestone outcrops, populations of threatened and rare plants, lime sinks, unique habitats, abandoned rice fields, pocosins, and areas that harbor a rich diversity of spring wildflowers. The 45 sites have been located on topographical maps and recommendations have been made to the U. S. Forest Service for management plans to preserve the integrity of the sites. The natural features of each site have been described. This study was supported by grants from the United States Forest Service and The Citadel Development Foundation.

POTTER, JEANNE M. and WAYNE A. POTTER Potomac Electric Power Company and Wayne A. Potter Environmental Consultants--Chlorine reduction studies at two estuarine power plants in Maryland.

Chlorine reduction studies were conducted

at two estuarine fossil fuel generating station, Chalk Point and Morgantown, April through November 1981. Decay rates and fouling control effectiveness of chlorine were determined for normal plant chlorination procedures during the summer and reduced chlorine doses during the fall. Fouling control effectiveness was monitored by comparing the extent of fouling accumulation on PVC plates exposed to ambient and chlorinated cooling water. Decay characteristics of chlorine were calculated from chemical analyses of the cooling water by amperometric titration. Both free and total residual oxidants were monitored at the intake embayment, condenser inlet, condenser outlet, and head of the discharge canal. Reductions of chlorine dosage were recommended when high oxidant residuals, low fouling accumulation, and normal condenser performance occurred. This research was funded by the Potomac Electric Power Company

POUNDS, J. ALAN,¹ JAMES F. JACKSON² and STEPHEN H. SHIVELY². University of Florida¹ and University of Southwestern Louisiana²--Allometric growth of the hind limbs of some terrestrial iguanid lizards.

Parameters of the allometric equation ($y = bx^a$) were estimated for relative growth in length of shank and thigh versus body length in five species of terrestrial iguanids. Measurements were made on preserved samples, each sample representing a cross section of age classes from a restricted locality. Both positive and negative allometry were observed, with the latter being more common. These results are consistent with Kramer's hypothesis that lizards should commonly show negative allometric growth of the hind limbs because this pattern would enhance the locomotor ability of vulnerable hatchlings. Dodson's hypothesis that positive allometry of hind limbs is correlated with an increase in home range size during ontogeny is not supported. We hypothesize that positive allometry in male scrub lizards represents a temporal patterning of investment in morphology in relation to a change in defensive behavior during ontogeny. Allometric growth in lizards may also be explicable in the context of maintaining similar biomechanical function with increasing size, or in terms of altering biomechanical function during ontogeny as in Laerm's habitat-shift model.

POWERS, MAUREEN T. University of Alabama/Dauphin Island Sea Lab--Multivariate analysis of alluvial hardwood swamps of the upper Mobile Delta.

The arborescent vegetation of 20 alluvial hardwood stands was sampled in order to examine species compositional relationships between stands and to delineate community types. Cluster and principal component analysis of the 20 stands based on species importance values identified three community types. Stepwise multiple discriminant analysis was applied to develop a multivariate indicator index which could be used

in distinguishing between community types and to assess the accuracy of the stand group assignments. Nine species were entered into the discriminant function. Use of these species as discriminating tools resulted in 100% classification of sites into the previously determined community types.

PRATT, JAMES R. and JOHN CAIRNS, JR.
Virginia Polytechnic Institute and State University--Export of species from sources of differing maturities.

Export of species from sources (epicenters) of differing ages and complexities was examined using laboratory mesocosms. Polyurethane foam artificial substrates were colonized by protozoans for different time periods in a small pond. Substrates were returned to the laboratory and used as epicenters for protozoan colonization of barren polyurethane foam "islands" in initially sterile mesocosms. Islands were exposed to epicenters for either 24 hr or continuously for 28 days. Islands from pairs of mesocosms exposed to epicenters of identical ages were sampled on days 1, 3, 7, 14, 21, and 28 after initial epicenter exposure. Colonization parameters were estimated by fitting numbers of colonizing species to the MacArthur-Wilson equilibrium model. Islands exposed continuously to epicenters were colonized by significantly more species than those exposed for only 24 hr. Islands exposed to immature, species poor epicenters were colonized by a greater proportion of the source community than those exposed to more mature, species rich epicenters. All islands were depauperate compared to sources except for those exposed to the most immature (1 day old) epicenter. Colonization continued at a reduced rate in spite of the absence of the source. Results suggest that in communities with rapid species turnover and rapidly reproducing species that the continuous presence of a species source is less important for colonization of a new habitat. Dispersal of potential colonists occurs rapidly in these communities. Less mature communities dominated by pioneer forms are more effective at producing colonists than more mature communities.

RABALAIS, NANCY N. University of Texas Marine Science Institute--Factors influencing the distribution of *Uca subcylindrica*.

Several species of fiddler crabs inhabit the coastal areas of the extreme western Gulf of Mexico, yet only one, *Uca subcylindrica*, has successfully adapted to the region's semi-arid habitats. It is endemic to this area and is restricted in range from the Corpus Christi-Aransas Bay system, USA (~28°N) to its southerly recrods at Barra del Tordo and Lomas del Real, Tamaulipas, Mexico (~23°N). The area is characterized by low rainfall of extreme variability and is sandwiched between more humid climates to the north and south. In contrast to other members of this primarily intertidal and tidally influenced genus, *U. subcylindrica* is found in supratidal areas several meters to several kilometers from permanent bodies of water. It is also common along the banks of

ephemeral streams and ponds up to 35 km from any marine or estuarine source of water. These crabs live in habitats periodically subject to hypersalinity, drying conditions and flooding. Several adaptations of this species in morphology, physiology, and, in particular, life history tactics have enabled it to inhabit semi-arid habitats where water resources are limited. Several lines of evidence suggest that *U. subcylindrica* is unable to compete with other *Uca* in more mesic environs. A possible evolutionary sequence leading to the present distribution of this species suggests that *U. subcylindrica*, or its progenitors, diverged from other *Uca* and were inhabitants of arid habitats of the Gulf of Mexico during the late Miocene. Limited populations were maintained during fluctuating climates of the Pleistocene rather than being restricted equatorially with other tropical and subtropical *Uca*. In post-Pleistocene recolonization of the Gulf of Mexico coastal habitats, *U. subcylindrica* maintained its competitive advantage in semi-arid habitats to the exclusion of other *Uca* which occupied those more mesic.

RANASINGHE, J. ANANDA. Marine Science Program, University of Alabama/Dauphin Island Sea Lab--Variation in estuarine benthic macroinfaunal communities: a benchmark study.

Peterson benthic grabs were taken monthly at four stations in Mobile Bay, Alabama for 30 months. Principal component analysis explained 47.9% of the variance in the biological data in the first three axes. Stepwise multiple discriminant of the species abundance data (1) yielded 74.8% correct classification of samples on the basis of station and season and (2) included 14 of the 25 most abundant species in the discriminant (indicator) function. These analyses have general application in environmental monitoring and impact assessment. They may also indicate a need for inclusion of temporal considerations in the definition of biocoenoses, especially those of short-lived organisms in highly variable environments.

REAGAN, NANCY L.. Western Carolina University--Larval life history of *Eurycea bislineata* in the southern Appalachians. *Eurycea bislineata* is a plethodontid salamander which ranges over the greater portion of the eastern United States and north into Canada. Members of this species in the southern Appalachians form the subspecies *E. b. wilderae*. Two male morphs of this subspecies are now recognized, *E. b. wilderae* and morph A. The taxonomic status of these morphs is unclear. The purpose of this study was to examine the larval life histories of a population of *E. b. wilderae* and a mixed population of *E. b. wilderae* and morph A and to compare these with published accounts of the larval period of morph A. Larval samples were collected monthly from June-October 1982 from one allopatric *E. b. wilderae* locality and one sympatric locality in western North Carolina. Larvae were anesthetized in the

field with ether in water and snout-vent measurements were taken. Developmental state was also recorded (hatchling, larva, or metamorph). Age classes were determined from size-frequency histograms constructed for each sample. E. b. wilderae and morph A in sympatry appear to have a 1 year post-hatching larval period. The allopatric population of E. b. wilderae appears to have a variable post-hatching larval period of 1 or 2 years. Implications of these results will be discussed.

REAGAN, NANCY L. and WILLIAM C. MCGIMSEY.
Western Carolina University--Life history of mygalomorph spider Antrodiaetus unicolor in western North Carolina.

Antrodiaetus unicolor is a primitive burrowing spider found primarily in the southern Appalachian region of the eastern United States. This species constructs a collapsible silk collar at the entrance to its burrow. These burrows are often found in dense aggregations along stream banks and road cuts within mesic forests. The purpose of this study was to determine the life history of a population of A. unicolor in western North Carolina. Age classes were identified from size-frequency histograms constructed from 874 burrow measurements taken during the summer of 1982. Burrow measurements were used to represent spider size since burrow entrance area was found to be positively correlated with spider cephalothorax area ($r=0.9596$, $p<0.0001$, $n=138$). It appears to take at least 6 years following emergence from the maternal burrow for males and females to reach maturity. A biennial reproductive cycle appears to be indicated.

ROBERTS, KEITH R. University of Southwestern Louisiana--The phylogenetic significance of the flagellar apparatus of the siphonous green alga Batophora oerstedii.

New information on the gamete structure of Batophora will be compared with published data on swarmer structure in other siphonous green algae and ulvacean genera. This information will be considered along with published information on mitosis, pigments, habitat, and life histories. A close relationship between Ulvales and green siphons is strongly indicated, and an origin of green siphons from filamentous ulvacean algae suggested. In siphonous green algae the basal bodies are connected by two non-striated components (the two "halves" of a capping plate) which are often linked by fibrous material which overlap at the middle of the capping plate. This arrangement in Batophora bears a superficial resemblance to a striated flagellar connective of the type found in the Chlorophyceae, but its nature is easily understood by comparison with other siphonous genera.

ROBERTS, MARVIN L. and ROBERT R. HAYNES.
University of Alabama--Chemosystematics of the genus Najas (Najadaceae).

The infrageneric classification of Najas has been based on leaf sheath morphology and the

occurrence of a floral envelope. Recent evidence from seed coat morphology suggest other divisions within the genus. An examination of flavonoid pigments in North American taxa indicates considerable diversity in flavonoid composition. Najas marina, in subgenus Najas, produces 7-O-glycosyl-flavones. The taxa of subgenus Caulinia produce the same compounds and also 5-O-substituted flavones and 3-O- and 7-O-substituted flavonols. Najas minor stands apart from these taxa in lacking 7-glycosylated flavonols. Geographic and/or seasonal variation in flavonoid profiles are apparent in several species. The flavonoid data largely support an infrageneric classification based on seed coat morphology.

ROGERS, ROBERT L. and JAY V. HUNER.
Southern University--Observations on life histories of crawfish on Southern University Baton Rouge campus.

Life histories of the crawfish on Southern University campus are being investigated. The collection sites are roadside ditches along Harding Boulevard, the campus lake, and its tributary. Four species were collected from the ditches including Falli-cambarus hedgepethi, Procambarus clarkii, P. acutus acutus, and another species suspected to be P. planirostris. Crawfish obtained from burrows included Cambarus diogenes, F. hedgepethi, and P. planirostris. It is believed that P. clarkii and P. a. acutus also burrow here since it is a temporary habitat. Two species were obtained from the tributary: P. clarkii and P. a. acutus. C. diogenes, F. hedgepethi, P. clarkii, and P. a. acutus were collected from burrows around the tributary. Only P. clarkii was collected from the lake, and only C. diogenes was collected from burrows around it. Dissolved oxygen, pH, and temperature for all three areas averaged 8.9 ppm, 7.3, and 25° C respectively for the ditches; 5 ppm, 7.9, and 23° C respectively for the tributary; and 6 ppm, 7.6, and 26.6° C respectively for the lake. Thus far the data has shown that P. clarkii is the dominant species of crawfish in open water and C. diogenes the dominant burrowing species.

ROZAS, LAWRENCE P. and COURTNEY T. HACKNEY. University of North Carolina at Wilmington--Utilization of Oligohaline Intertidal Rivulets by Fishes and Macrofaunal Crustaceans in the Cape Fear River Estuary, North Carolina.

Fishes and invertebrate macrofauna were collected from three intertidal rivulets located in an oligohaline marsh in southeastern North Carolina from July 1981 through June 1982. The composition, relative abundance and seasonal distribution of these

animals were determined. A total of 31,147 organisms with a mass (wet weight) of 14,379 kg was collected during 26 sampling periods. Twenty-nine species of fishes representing 19 families and four species of invertebrates were collected. The most abundant species were spot (*Leiostomus xanthurus*), grass shrimp (*Palaemonetes pugio*), bay anchovy (*Anchoa mitchilli*) and Atlantic menhaden (*Brevoortia tyrannus*). The major piscivorous predators collected from a tidal creek were freshwater species (longnose gar, *Lepisosteus osseus* and largemouth bass, *Micropterus salmoides*). The number of species was greatest during the warmer months. There were three seasonal peaks of abundance attributed to the recruitment of juveniles of spot, Atlantic menhaden, Atlantic croaker (*Micropogonias undulatus*), and southern flounder (*Paralichthys lethostigma*) in the spring; bay anchovy and grass shrimp in the fall; and grass shrimp in the summer. The occurrence of these species was unrelated to salinity in the study area, but dependent on time of year. The results suggest that oligohaline areas contain important nursery habitat for some estuarine species.

RYALS, PHILLIP E. and HARRIETT E. SMITH. University of Alabama--Enhancement of heat-shock induced morphological transformation in *Tetrahymena vorax* by d-alpha-tocopheryl succinate Type IV and succinate.

The polymorphic ciliate, *Tetrahymena vorax*, may be induced to undergo morphological transformation by several methods including subjecting the organism to a series of alternating heat and cool shocks. Recent studies have shown that alpha-tocopheryl succinate will induce morphological transformation in other organisms, including the heterotrich ciliate, *Blepharisma americanum*. We have investigated the effect of d-alpha-tocopheryl succinate and succinate on the transformation of *T. vorax*. Results indicate an enhancement of transformation in heat-shocked *T. vorax* by the addition of d-alpha-tocopheryl succinate and a lesser enhancement by the addition of succinate.

SANDERSON, WILLIAM E. Louisiana State University--Taxonomy of the green water snake, *Nerodia cyclopion*.

The two subspecies of the Green Water Snake, *Nerodia cyclopion*, have been recognized since 1936. However, in recent years, immunoelectrophoretic, comparative ecologic, and distributional data have brought the present taxonomic arrangement into question. A detailed morphologic analysis was undertaken in an attempt to resolve this problem. The results of the analysis indicate that the two forms are closely related sibling species, one of the numerous East-West species pairs occurring in the southern United States. Morphometric data, primarily in the form of head scale dimensions, were found to reflect the documented dietary preferences of the two forms. The western species, a fish specialist, was found to have a longer, more slender snout than the eastern species, a feeding generalist.

Sasser, C.E., W.B. Johnson, and J.G. Gosselink. Louisiana State University--Atchafalaya Delta Vegetation: Establishment and Development.

A qualitative description is presented of vegetation establishment and development on islands in Atchafalaya Bay since subaerial exposure in 1973 allowed plant colonization. The vegetation of the whole delta was mapped from low level color infra-red aerial imagery, and fine structure determined from permanent ground transects. A well defined and recurring sequence of plant colonization has been observed, beginning with colonization of mud flats by algae and progressing to submerged aquatics, emergent herbaceous marshes, and arboreal stands. Spatial and temporal components of these vegetative associations are controlled by a combination of riverine and tidal influences.

SCELZO, MARCELO A. Escuela de Ciencias Aplicadas del Mar, Universidad de Oriente, Apartado 321, Isla Margarita, Venezuela--Anomuran Porcellanid Crabs from Margarita and Cubagua Islands, Venezuela.

Seventeen species belonging to six genera were gathered as a result of collections of littoral porcellanid crabs made along the coastal areas in Margarita and Cubagua Islands since 1980. Six species are reported for the first time for Venezuelan marine waters: *Pachycheles serratus* (Benedict), *P. eusebianus* Gore & Abele, *Petrolisthes tonsorius* Haig, *P. ceasecui* (A. Milne Edwards), *P. magdalenensis* Warding and *Pleidia brasiliensis* Haig (?). Previously this study only twenty-one species of nine genera of Porcellanids were reported for Venezuela: six species for Margarita and twelve species for Cubagua. Up dating of this information yields a total of thirteen species for Margarita and eighteen for Cubagua accounting for a total Porcellanid fauna of twenty-seven species belonging to ten genera for Venezuela. The highest number of Porcellanids in Venezuela is found to occur within Cubagua Island waters, perhaps due to the well developed coral communities and up welling influences (Cariaco Trench) in this region. A biogeographic discussion in regard to the Porcellanid fauna in the Caribbean Sea will be presented.

SEMLITSCH, RAYMOND D. Savannah River Ecology Laboratory--Burrowing ability and behavior of salamanders of the genus *Ambystoma*.

The burrowing ability and behavior of five species of fossorial salamanders of the genus *Ambystoma* were examined in the laboratory. Individual salamanders were subjected to three experimental treatments to test the hypothesis that salamanders do not actively dig their own burrows but alternatively enlarge cracks, crevices, and invertebrate or small mammal burrows for occupancy. One species, *A. tigrinum*, actively dug burrows under all experimental treatments while *A. talpoideum* actively dug 50% of the time. The other species

(*A. opacum*, *A. annulatum*, *A. maculatum*) burrowed passively by using their snout and body to enlarge holes or cracks provided. Individual salamanders not able to burrow (actively or passively) underground incurred significant water loss (25-39%) and several died after a 24-hour test period. Digging ability was not clearly related to snout-vent length, head width, or forelimb diameter. These data suggest that the digging ability of ambystomatid salamanders may be a behavioral adaptation and is not simply related to morphology.

SHERIDAN, MARK, JAMES JOY and DONALD TARTER. Marshall University--The occurrence of the acanthocephalan *Pomphorynchus bulbocolli* in freshwater drum from the Ohio River, mile point 279.

The intestines of 174 freshwater drum, *Aplodinotus grunniens*, were examined for *Pomphorynchus bulbocolli*, an acanthocephalan parasite, over a seven-month period (April-October). Approximately 82 percent (142 of 174) of the fish were infested by a total of 1553 worms (mean 10.9; range 1-60). Increased incidence of infestation was positively correlated ($r = 0.24$) between fish length and the prevalence of parasites. This is the first report of *P. bulbocolli* from West Virginia.

SHERIDAN, MARK and DONALD TARTER. Marshall University--Food habits of the freshwater drum, *Aplodinotus grunniens*, from the Gallipolis Locks and Dam, Ohio River, mile point 279.

The food habits of the freshwater drum, *Aplodinotus grunniens* (Rafinesque), were examined for eight months (April-November, 1982). Emerald shiners, *Notropis atherinoides* (Rafinesque), made up the bulk of the drum's diet. Darters, *Etheostoma* sp., and gizzard shad, *Dorosoma cepedianum* (Lesueur), supplemented the diet in spring and fall, respectively. Caddisfly larvae, *Cheumatopsyche* and *Hydropsyche*, served as a secondary food source throughout the study. Utilization of crayfish, *Orconectes* sp., and mussels, *Corbicula* sp., occurred rarely. Young-of-the-year drum fed mainly on copepods and chironomid midges.

SHIVELY, STEPHEN H. and JAMES F. JACKSON. University of Southwestern Louisiana--Factors limiting the upstream distribution of the Sabine map turtle, *Graptemys ouachitensis sabinensis*.

Population densities of *Graptemys ouachitensis sabinensis* and several environmental variables were measured in a transect along Ouiska Chitto Creek (Calcasieu River drainage) that ranged from downstream localities abundant with turtles to upstream localities that were uninhabited. Correlations between environmental variables and population densities were calculated over 6 study

sites, and over 72 subdivisions of 5 of those sites. A causal model for the effects of the environmental variables on population density was hypothesized, and its consequences were investigated by path analysis. Path coefficients of the model were calculated from correlation coefficients between variables. Algal density on logs, and basking site area emerged from this analysis as the most important proximal determinants of turtle density. Of the variables measured, stream width appeared to be the ultimate determinant of density, but its effect was mainly through intervening variables. A discriminant function was used to classify patches of habitat as either favorable or poor, and differences in the distribution of favorable patches between downstream and upstream sites were investigated. Patches of good habitat tend to become smaller and more isolated upstream, and the utilization of these patches decreases with distance upstream. This information supports the hypothesis that range termination involves 1) reproduction below replacement levels in upstream populations and 2) increasing difficulty in upstream dispersal leading to progressive reduction of dispersal pools upstream.

SHOOP, W.L., and K.C. CORKUM. Louisiana State University--Transmammary infection with mesocercariae of *Alaria marcianae* (Trematoda: Diplostomidae).

Transmammary infection with *Alaria marcianae* mesocercariae is demonstrated using mice as model, paratenic hosts. Prenatal transmission was ruled out as neonates removed immediately postpartum from infected dams were never infected. Mesocercarial distribution in dams examined immediately postpartum and in virgin female controls showed no marked preference for the mammary glands. In contrast, infection of neonates that were allowed to suckle was absolute, and the number of mesocercariae in the mammary glands of postparturient dams that suckled their young was increased significantly. These experimental observations are coupled with other observations on paratenic and definitive hosts to outline three distinct pathways open to mesocercariae in pregnant, mammalian hosts: (1) in euparatenic hosts the mesocercariae remain undifferentiated in both parent and offspring; (2) in amphiparatenic hosts the parents are paratenic, but the mesocercariae mature to adult in the offspring; and (3) in definitive hosts both parent and offspring possess the physiological requirements for maturation of mesocercaria to the adult.

SIEC, JÜRGEN AND RICHARD W. HEARD. Universität Osnabrück/Abt. Vechta Germany, and Gulf Coast Research Laboratory--Distribution patterns of Tanaidacea in the Caribbean Sea and the Gulf of Mexico. Analysis and preliminary results.

A list of species recorded so far from the Caribbean Sea and the Gulf of Mexico is given.

The distribution of each species is discussed within the region as well as worldwide. The computer-produced maps show that knowledge of records allows only a very limited explanation of the origin of the tanaid fauna. Especially, the information on the deep-sea species is too limited to permit practicable results. But on the basis of phylogenetic considerations an attempt at some initial explanations of the faunal origins is possible. The analysis establishes that the tanaid fauna is heterogeneous, so colonization must have taken place from different regions. In some shallow-water apseudoid genera (Kalliapseudes, Pagurapseudes) the very close relationship of species known from the Pacific coasts of Central America and California with those known from the Gulf of Mexico and adjacent regions can be explained by geological phenomena. A second group of species might be more or less endemic, because the distribution is limited in the north by the Bermudas and in the south to the southern coasts of Brazil. There are also connections to the Mediterranean and Southern-Atlantic fauna.

SIKORA, WALTER B. AND JEAN PANTELL SIKORA. Louisiana State University--Benthic Infauna of the Atchafalaya Delta: pioneers or survivors?

Benthic infaunal community structure in the Atchafalaya Delta and Four League Bay differs from that of other estuarine benthic communities in Louisiana. Patterns of macrofauna and meiofauna abundance and biomass and macrofauna diversity are examined and described. Comparisons are made between these patterns and those of other estuarine communities. How the benthic community structure affects the functional relationships of the benthos and other components of the estuarine system will be discussed.

SMATHERS, GARRETT A.,¹ PAUL R. SAUNDERS² and GEORGE S. RAMSEUR,³ Western Carolina University,¹ Washington State University,² and University of the South³--Soil investigation of a spruce-fir burn in the Plott Balsam Mountains, North Carolina.

Examination of charcoal in soils of a spruce-fir forest that burned in 1955, and the surrounding unburned stands suggest that fires have occurred in this locality for several thousand years. Soil profiles both within and outside the burnsite characterize a soil series that is found under heath-grassland balds rather than that generally associated with spruce-fir stands. This and future investigations of spruce-fir forest soils may provide further information on the origin and maintenance of balds in this vegetation type.

SMITH, CERALD L. University of Georgia--An infrageneric classification for *Piptocarpha* R. Br.

Piptocarpha is a neotropical genus (Compositae: Vernoniaeae) consisting of ca. 45 species. The main center of

distribution is the coastal forests of eastern and southern Brazil, but it also inhabits forests in most of central and northern South America. Striking features are the scandent or tree habit and the axillary inflorescences, which frequently take the form of dense globose glomerules. A morphological study of *Piptocarpha* has shown that it is diverse and should be divided into two subgenera, each with several subdivisions. An indepth study of leaf flavonoids supports this classification and has given invaluable insight for the placement of the tree species. Flavonoids also suggest some evolutionary trends within the genus which correlate well with parallel morphological trends.

SNYDER, DAVID H. Austin Peay State University--The apparent crash and possible extinction of the green salamander, *Aneides aeneus*, in the Carolinas.

Aneides aeneus occurs in the Appalachian Mountains from southwest Pennsylvania to northeast Mississippi. A disjunct population occurs in the Blue Ridge Mountains of the Carolinas and Georgia. The Carolinas population, intact as late as the mid-1970s, has apparently crashed to near-extinction. This judgment is based upon several unsuccessful attempts by me in recent years to find specimens at sites with which I am quite familiar, and which I know harbored vigorous *Aneides* populations in the early 1970s. From personal communications with several other workers familiar with the Carolinas population who have also been unable to find specimens recently, it seems that the crash is real. A thorough search in summer of 1982 of a remote and I believe unknown (except to me) site which was vigorous in the summer of 1970 when I last visited it was fruitless. At least one individual *Aneides* was reported from the vicinity of Bat Cave in Rutherford County, NC, in the summer of 1982, at the extreme northeastern limit of the Carolinas population's known range. The cause of the population crash is unknown. Circumstantial evidence suggests that acid rainfall may be in some way responsible, but the ecological and physiological data needed to strengthen or reject that thesis have not yet been assessed. Predation, disease, and over collecting by man seem, for several reasons relating to the ecology and life history of the Carolinas population, to be much less likely causes of the population crash.

SOTO, LUIS A. Instituto de Ciencias del Mar y Limnología, UNAM.--Distributional patterns of the decapod crustacean shelf-fauna of the northeastern Gulf of Mexico.

From a trawling survey conducted on the continental shelf of the NE Gulf, 120 species of decapod crustaceans were identified. The decapod shelf-fauna exhibited two distinct distributional patterns. The first one is a discontinuous type of dispersion consisting of the confinement of the faunal elements to the eastern half of the NE Gulf. The De Soto Can-

yon area constitutes the western boundary for most of these components. The second one is ubiquitous in nature, that is, the species may occur indistinctly on the eastern or western halves of the area of study. The components adopting this modality of distribution were essentially found in the former subregion, regardless of the different sampling effort applied to the above subregions. Examination of the average bottom temperatures recorded in each season failed to reveal sharp gradients in the isotherm profiles which could explain the segregation of species from any of the subregions. It is rather the depth and the nature of substratum that seem to play a major role on the distribution of the shelf-fauna of the NE Gulf.

SPIVEY, HENRY R. Florida State University
--The Recent cirriped fauna of the Gulf of Mexico: A biogeographical analysis.

Latitudinal, bathymetric and stratigraphic distributions have been examined for the 90 known species and subspecies occurring in the Gulf of Mexico. Represented are more than 15 families and over 35 genera, about half of which can be placed in the Gulf Region prior to closure of the Bolivar Seaway in the upper Pliocene. Comparison of numbers of late Tertiary fossil and Recent balanomorph barnacles within tropical America suggests that the present generic composition of the Gulf fauna is largely the result of diversification of the tropical Western Atlantic fauna in the Quaternary. Latitudinal distributions of Recent taxa occupying benthic shelf habitats (0-180 m) indicate that the Gulf is a transition region or zone between tropical and north temperate cirriped assemblages. Over half of the species reported from the lower Caribbean, and from Cape Cod, occur here. Excluding the single endemic species, 19 of remaining 41 resident shelf taxa occur in the western Atlantic only in tropical waters, 2 only in temperate waters and 20 in both. In the Gulf temperate species range south of 25°N and over half of strictly tropical taxa range north of 29°N; eurythermal taxa are widely distributed as expected. The numerically more diverse tropical elements are derived equally from the West Indian and Caribbean Faunal Provinces.

Stalter, Richard. St. John's
Univeristy--Is Hempstead Plains,
Long Island, New York, a Stable
Plant Community?

Herbaceous and shrubby vegetation of Hempstead Plains, in the vicinity of Mitchell Field, Long Island, New York, was sampled by the quadrat method during 1980-1981, to determine species composition and dominance. Three fields at Mitchell Field were selected for study. Abundance classes for each species in each field were recorded. Rubus allegheniensis, members of the gramineae and compositae are dominant. Soil texture, distribution of soil material, fire, grazing, mowing, drought, allelopathy, and the activi-

ty of small mammals are factors that might have produced the original vegetation. The fate of Hempstead Plains as a stable, treeless community cannot be predicted with certainty.

STEIN, DIANA W., JAMES S. ROGERS and
ROBERT C. CASHNER. University of New
Orleans--Preliminary Study of Isozyme
Variability in the Cherryfin Shiner,
Notropis (Lythrurus) roseipinnis Hay.

Electrophoretic analyses were performed on muscle tissue of the cherryfin shiner, Notropis roseipinnis, from throughout its range in southeastern United States. A total of approximately 40 alleles was resolved for 21 loci in 18 populations. Most populations were essentially monomorphic for LDH-1 & 2, S-MDH-1 & 2, G-3-PDH, PGM, S-GOT, AK, CK, GP-1, 2 & 3, ICD, ME,PCDH and G-6-PDH. Cherryfin shiners from the Lake Pontchartrain drainage (including Amite, Tangipahoa and Tchufuncte rivers) exhibited a high degree of variability for GPI-1 and M-MDH-1. Mississippi River drainage populations (Coles Creek and Bayou Pierre) are significantly different from other N. roseipinnis populations at M-MDH-1 and AK.

Sternfeld, J., and C.N. David, University
of Southwestern Louisiana and Zoologisches
Institut, Munich.--Fate and regulation of
anterior-like cells in Dictyostelium.

A pattern of two tissue types (anterior and posterior) exists in the Dictyostelium slug. Contained within the posterior tissue are anterior-like cells which comprise about 10% of the developing cell mass. For more than 72 hr of slug migration the proportion of these cells is closely regulated. They are randomly distributed along the anterior-posterior axis but about twice as many are localized in the ventral portion of the slug posterior than in the dorsal portion. As the slug begins to form a fruiting body these cells sort out into two groups. In the mature fruiting body the anterior-like cells remain as undifferentiated amoebae at the apex and base of the sorus. Removal of anterior tissue from a slug initiates two events. (1) Some of the anterior-like cells, probably guided by chemotaxis to cyclic AMP, sort out from the posterior tissue. (2) Some prespore cells redifferentiate into anterior-like cells. These events result in the regeneration of a new anterior-posterior pattern and the reestablishment of the original proportions of each cell type by about 8 hr. Furthermore, while the anterior-like cells which lie in slug posteriors remain as amoebae in fruiting bodies, the anterior-like cells which form the anteriors of regenerated slugs subsequently become stalk cells. Thus, it appears that for a cell to differentiate as a stalk cell, it must first be exposed to some form of signal which is present in both the anterior and prebasal disc regions. This research was supported by grants from the NIH (GM1301 and HD0 7154-01) and the NSF (77-25426).

STEWART, CECILIA, W. LENA AUSTIN, and LAFAYETTE FREDERICK. Howard University--Membrane regulation of the pitted wall of *Gelasinospora* ascospores.

A pitted wall surface pattern characterizes ascospores of species in the genus *Gelasinospora*. It is on the basis of this feature that the genus is distinguished from two other closely related genera, viz., *Neurospora*, with a rib-vein wall surface topography, and *Sordaria* with a smooth wall surface. Studies on the mechanism regulating the delineation of the rib-vein wall surface pattern in *Neurospora* ascospores have revealed the presence of a system of internal membranes, termed intrasporal membrane plaques (IMP), that determine rib-vein position. Developing ascospores of *Gelasinospora reticulospora* have been studied at the ultrastructural level in order to ascertain whether a comparable membrane system is responsible for the delineation of the pitted wall surface of ascospores in this genus. Our studies show that during the early stages of ascospore wall formation membrane profiles similar to the IMP of *Neurospora* ascospores, become appressed to the inner surface of the young spore plasmalemma in a precise and ordered fashion. Subsequently, as the pitted wall of the perisporium forms wall material is prevented from being deposited on the outer plasmalemma surface opposite the IMP. Instead, wall deposition occurs only on the external plasmalemma surface between the IMP positions. This depositional pattern results in the occurrence of prominent pits in this layer of the fully developed perisporium and is responsible for the distinctive wall surface topography that *Gelasinospora* ascospores possess.

STONE, BENJAMIN P. Austin Peay State University--2-Deoxy-D-Glucose reversal of IAA and GA enhanced plant growth responses.

2-Deoxy-D-Glucose (2-dG) inhibited GA stimulation of lettuce seedling hypocotyl elongation. 6-Deoxy-D-Glucose, had no inhibitory effect. Lettuce seedling root growth was more sensitive to 2-dG inhibition than hypocotyl growth. The inhibitory effect of 2-dG was reversed with glucose at a ratio of 20:1. The effect of 2-dG on *Avena* coleoptile and pea stem segment growth responses will be presented. Incorporation of mannose and lysine into glycoprotein and protein will be discussed relative to 2-dG inhibition of appropriate hormone stimulated growth responses.

STOUT, JUDY P. University of South Alabama/Dauphin Island Sea Lab--*Juncus roemerianus* marshes of the north central Gulf coast.

The black needlerush, *Juncus roemerianus*, dominates over 1.8 million hectares of tidal marsh in an arc of the north central Gulf from the mouth of the Mississippi River to Crystal River, Florida. Warm temperate conditions provide for year-round growth of

most marsh plants and high biomass production. Annual aboveground net primary productivity estimates range from 0.24-2.0 Kg m⁻² yr⁻¹ for *J. roemerianus* to 0.48-2.9 Kg m⁻² yr⁻¹ for *Spartina cynosuroides*. Other species which contribute significantly to community composition and production are *S. alterniflora*, *S. patens* and *Distichlis spicata*. Belowground primary production estimates average 1.5 to 3 times the levels of aboveground. Conocephaline grasshoppers are principal grazers, removing 0.03% of ANPP and directly causing 0.07% of ANPP to fall to the detrital mat. Diurnal tides of low amplitude (1 meter or less) result in irregular flooding of short duration and remove significant amounts of detritus only during storms and wind driven high tides. Decomposition occurs rapidly for most species and pulses of detritus introduced to the estuaries and Gulf help support the nation's largest shrimp fishery.

STRINGFELLOW, FRANK. USDA, Animal Parasitology Institute--A unique bioassay: *Haemonchus contortus* adult male spicule-sheaths attract conspecific larvae.

Many adult gastrointestinal nematodes of agricultural importance are too large to bioassay for the presence of chemical attractants with present methods. A unique bioassay is reported using infective larvae of *Haemonchus contortus* as responders. One thousand infective larvae were pipetted onto the surface of a 2% agar petri plate midway between a control and a test agar block. Both blocks were simply agar but the test block had three spicule-sheaths dissected from adult males placed on top of it. The larvae migrated freely over the surface of the agar petri plate (pH 7) for 24 hrs; then the number of larvae both on top of and within each agar block was counted. Adult males harvested directly from sheep and those subcultured for 18 hrs in vitro were tested for the presence of an attractant. The data showed that the larvae spread over the agar petri plates at random after 24 hrs. The larvae responded significantly to the test agar blocks with the spicule-sheaths from adult worms harvested from the abomasum of sheep indicating that an attractant was produced by the spicule-sheaths. The larvae did not respond significantly to the test agar blocks with spicule-sheaths dissected from adult male worms subcultured in vitro. There was no attempt to determine if the attractant produced in vivo was a sex pheromone; however, adult worms subcultured for 18 hrs in vitro lost the capacity to produce the attractant. The data also indicated that receptors had the potential to receive specific chemical stimuli even as young as the infective larval stage.

STRITCH, LAWRENCE R. and ROBERT H. MOHLENBROCK. Southern Illinois University at Carbondale--The Genus *Penstemon* in Illinois.

While preparing the treatment of *Penstemon* for the Illustrated Flora of Illinois, the

authors have undertaken a detailed study of this genus in the field and in various herbaria. As a result of this study, three taxa previously unlisted for Illinois have been added to the flora, and one species has been deleted. This paper discusses briefly each taxon of Penstemon in Illinois.

STUCK, KENNETH C. Gulf Coast Research Laboratory--The larval development of *Arenaeus cribrarius* (Lamarck), under laboratory conditions.

Larvae of a number of species of portunid crabs are frequently collected in plankton samples from the northern Gulf of Mexico. At present, the larval development of relatively few of these species have been described. The speckled swimcrab, *Arenaeus cribrarius* commonly inhabits the shallow surf zone areas along sandy beaches of the Gulf of Mexico. The larval development of *A. cribrarius* has not previously been studied.

Larvae obtained from an ovigerous *A. cribrarius* collected from Horn Island, Mississippi, were hatched in the laboratory and reared in mass culture through the third crab stage. Complete larval development from hatching to first crab required 42-52 days. Eight zoeal and one megalopal stage were obtained and described. The larval development of *A. cribrarius* is unique among other northern Gulf portunidae in the occurrence of an eighth zoeal stage as part of its normal development and the unusually large size of the megalopa and subsequent first crab stage. Morphological characteristics of *A. cribrarius* zoeae and megalopa are compared in detail with larval *Callinectes sapidus*, *C. similis*, *Portunus gibbesii* and *P. spinicarpus*.

STUCK, KENNETH C. Gulf Coast Research Laboratory--Observations on the distribution of pelagic Peracarida in the northern Gulf of Mexico.

Of the five orders included in the superorder Peracarida, only members of the orders Mysidacea and Amphipoda can be considered truly pelagic in habitat. Members of the suborder Hyperideae, of which approximately 60 species are known from the Gulf of Mexico, dominate the pelagic amphipod fauna. Three species, *Lestrigonus bengalensis*, *Simorhynchotus antennarius* and *Tetrathyrus forcipatus* are commonly encountered in neritic waters. Other species are sporadic in occurrence, appearing more frequently during summer months. Twenty-eight species of Mysidacea are known from the Gulf of Mexico, however, only six species are commonly taken in plankton samples. *Mysidopsis bigalowi* and *Promysis atlantica* are the dominant neritic species. *Siriella thompsonii* is most abundant in oceanic waters beyond the continental slope. Similarities between Caribbean-Gulf of Mexico and eastern Atlantic hyperiideans emphasize the strong influence of oceanic surface current in determining species composition in the northern Gulf. The northern extension of the Yucatan Loop Current may be significant in determining both pelagic mysidacean and hyperiidean species composition in neritic waters of Louisiana and Mississippi.

STUCKY, JON M. North Carolina State University--Comparative reproductive biology of two sympatric species of *Ipomoea* (Convolvulaceae).

Ipomoea hederacea and *I. purpurea* often form ecologically sympatric populations in cultivated areas throughout much of the eastern United States. Analyses of floral and plant morphology, patterns of corolla light reflectance and nectar production, and hymenopteran forager behavior indicate that *I. purpurea* is more attractive to foragers than is *I. hederacea*. Hourly changes in the size of stigmatic pollen loads, numbers of pollen tubes in styles, and seed set following different flower manipulation treatments demonstrate that the reproductive system of *I. purpurea* is closely attuned to insect activity while that of *I. hederacea* is nearly independent of this activity.

STUTTS, JOHN G. University of Georgia. *Vernonia* subsection *Chamaedrys* Cabrera.

Vernonia subsection *Chamaedrys* was first delimited by Cabrera (1944) and later redefined by S. B. Jones, Jr. (1979). The group consists of fruticose perennials and shrubs and is centered in southern Brazil. The central core of subsection *Chamaedrys* seems to be well distinguished from other groupings of *Vernonia* although some of the marginal species seem to have close affinities to other groups. Field work in Brazil has led to a much better understanding of this group.

SULLIVAN, GENE A. Louisiana State University -- The biogeography of *Ladenbergia Klotzsch*.

The genus *Ladenbergia* is representative of the tribe *Cinchoneae* in the New World, originating in northwestern South America. Most species are from the eastern premontane forests of the Andes. However, endemic species are found in southeastern Brazil and in Central America. Populations previously described as disjunct between Central and South America have proven to be distinct species. Moreover, the Central American species are polyphyletic, giving evidence for at least two invasions by South American elements since the formation of the Panamanian land bridge.

TARTER, DONALD C., DWIGHT L. CHAFFEE, and KIMBERLY B. BENSON. Marshall University--Low pH tolerance, under laboratory conditions, of the nymphs of three congeneric mayflies, *Baetisca* *berneri*, *B. carolina* and *B. lacustris*.

The nymphal populations of the mayflies *Baetisca* *berneri* Tarter and Kirchner, *B. carolina* Traver and *B. lacustris* McDunnough were experimentally tested under laboratory conditions to determine their tolerance to low pH. The straight-line graphical interpolation method was employed to determine the pH values at which 50 percent of the

mayflies survived after 96 hours. The TLM⁹⁶ pH values were 3.6, 3.5 and 3.2 for B. lacustris, B. carolina and B. berneri, respectively.

TAYLOR, ROSANNAH,¹ JOHN E. MAYFIELD,¹ and WALTER C. SHORTLE.² Atlanta University¹ and Northeastern Forest Experiment Station²--Effects of catechol on the ultrastructure of Polyporus versicolor. Before wood is decomposed by decay fungi, it is altered by a complex system involving nondecay organisms, extracellular products of the decay fungus, and the response of host tissue. Since phenolic compounds, which inhibit the growth of decay fungi, accumulate in injured or infected tree tissues, catechol was used to study the cytological nature of their inhibition. Catechol (1mg/ml) was added to the culture medium prior to inoculation with Polyporus versicolor and during the early log, late log, and decline phases of growth in liquid medium. Cultures were fixed for electron microscopy at 12, 24, and 72 hours after the addition of catechol. Hyphae treated with catechol in the early log phase displayed alterations along the nuclear membrane, shorter mitochondrial profiles, and only smooth endoplasmic reticulum. Unlike nontreated cultures, the vesicles were not coated and were void of electron dense material. The contrast between the ultrastructural appearance of nontreated and catechol-treated hyphae decreased as one progresses to the hyphae treated with catechol during the late log growth phase. The hyphae of cultures exposed to catechol during the decline phase were highly vacuolated with scattered clumps of electron dense granules, vesicles and structures with poorly defined membranes.

TETRAKE D. (MERNER), H. R. MUSHINSKY, and J. OKAFOR. University of South Florida--Occurrence and distribution of Basidiobolus sp. in the digestive tract of some amphibians and reptiles from Florida.

Although species of Basidiobolus seem to be ubiquitous, it is only in tropical and subtropical regions that these fungi may cause human subcutaneous disease. This study focuses on the distribution and occurrence of these organisms in the guts of amphibians and reptiles in southern Florida. These fungi were isolated from the feces of about 30% of the anoles and about 35% of the toads so far investigated. Sixteen anoles were kept in separate cages for periods ranging from one week to three months during which time these fecal droppings were regularly cultured on agar plates for isolation of Basidiobolus. Nine gave positive growth of this fungus in the first two or three droppings and none in the subsequent ones when these animals were starved. Feeding mealworms and some flies yielded no positive growth but when fed mealworms that had crawled over cultures of this fungus some animals again gave positive growth. These studies support much earlier European studies.

THOMPSON, BRUCE A. and LINDA A. DEEGAN. Louisiana State University--The Atchafalaya Delta Fish Fauna: Estuarine Sense and Non-sense.

The dynamics of the coastal Louisiana fish fauna has been greatly influenced by the growth and decay of river deltas and the alteration of the configuration of the coastal zone. At present a new episode of delta-building is occurring in the eastern half of the Atchafalaya Bay. Even though the estuaries in Louisiana generally have low salinities, historical information indicates the fish community of the Atchafalaya Bay to have been primarily marine. The salinity regime of the delta area is now freshwater for virtually the entire year, but the estuarine-marine component remains a dominant part of the fish community. The delta islands function as a nursery area for many of the common fish species found in higher salinity elsewhere in southeastern United States. Many of these species are found only as larvae and small young-of-the-year. The bulk of the standing stock of the fishes is made up by the freshwater component of the community. The estuarine-marine portion of the community continues the dynamics of their complicated life-history patterns in face of many habitat perturbations. At present, the Atchafalaya fish fauna has not become entirely freshwater as had been predicted. This has interesting implications for the many management programs for freshwater diversion, salinity intrusion abatement in Louisiana. It also points to the problems in setting up any functional ecological salinity classifications for estuarine fishes. In the life history of fishes, the estuaries of Louisiana extend out into the shallow shelf of the Gulf of Mexico.

THOMPSON, BRUCE A. and ROYAL D. SUTTKUS. Louisiana State University and Tulane University--A Comparison of the Fish Community of Lake Pontchartrain between 1953 and 1978.

Lake Pontchartrain is a large (1632 sq km), shallow, relatively restricted water body that is part of a complex interconnected estuarine system in southeast Louisiana. During 1953-55 and 1978 ecological surveys were conducted in the lake that included extensive fish collections. The lake forms the northern boundary of metropolitan New Orleans and many of man's activities affect some aspect of the functional dynamics of the lake and its surrounding wetlands. At present there exists controversy among government agencies and researchers over what ecological changes have occurred in the lake over this 25 year period. Anchoa mitchilli, Microponogonias undulatus, Brevoortia patronus, Leiostomus xanthurus, and Arius felis were the five most abundant species in the 1953/54 survey and four of these five species remained the most abundant in 1978. Menidia beryllina replaced Arius felis in 1978. Comparison of lake variables showed a decrease in water clarity, but little change in salinity or water temperature. The lake continues to function primarily as a nursery and overall the fish community remains relatively healthy.

1978 study funded by U.S. Army Engineer District, New Orleans. Contract No. OACW 29-77-C-0253.

TIMMONS, TOM J. Murray State University
--Initial changes in fish species composition in two new lakes of the Tennessee-Tombigbee Waterway, Alabama - Mississippi.

The impoundment of Gainesville Lake (2600 hectares) in 1978 and Aliceville Lake (3400 hectares) in 1979 changed many miles of flowing water of the Tombigbee River to lakes with moderate flow in the old channel. Changes in species composition during the first three years of impoundment were compared to pre-impoundment studies of those sections of river by Caldwell in 1969 and Boschung in 1973. Species absent from post-impoundment collections in both lakes included: Alosa alabamiae, Hiodon tergisus, Camptostoma anomalum, Hybopsis aestivalis, Notropis baileyi, N. bellus, N. volucellus, Hypentelium etowanum, Noturus munitus, Ammocrypta asprella, Etheostoma histrio, E. nigrum, E. rupestre, Percina nigrofasciata, P. shumardi, and P. ouchitae. Additional species were absent that had been collected by Caldwell or Boschung in just one of the areas that are now lakes. Six species were collected that were absent from the early surveys: Polyodon spathula, striped bass X white bass hybrids, Ictalurus nebulosus, Lepomis marginatus, Etheostoma fusiforme, and a single Notropis lutrensis. The dominant species by number and biomass in the lakes after impoundment were gizzard and threadfin shad, bluegill, smallmouth buffalo, white crappie, carp, and largemouth bass.

TOOLE, JOSEPH E., SHOOP, WESLEY L., DUOBINIS-GRAY, LEON F., and CORKUM, KENNETH C. Louisiana State University--Observations on the natural history of Linstowiella szidati (Anderson, 1944) (Trematoda: Cyathocotylidae).

Natural infections of intermediate and definitive hosts are reported for Linstowiella szidati (Anderson, 1944) from Bayou Manchac, Iberville Parish, Louisiana. Snails identified as Viviparus intertextus were found liberating furcocercous cercariae of L. szidati and harboring the daughter sporocysts. Eighty-five percent of the snails examined were infected. Fully developed metacercariae were found in the somatic musculature of the bowfin, Amia calva. Other fish species examined were: Elassoma zonatum, Gambusia affinis, Lepomis gulosus, and Notropis atherinoides; all were negative. Specimens of G. affinis were experimentally infected with metacercariae, but the larvae were poorly developed. Adults of L.

szidati were found in the opossum, Didelphis virginiana, and the raccoon, Procyon lotor. All birds examined from the study site were negative. These results are significant since previous reports of experimental infections identified L. szidati as a bird parasite.

TRAMMEL, HERBERT E. and SHARON PATTON. University of Tennessee--Gastrointestinal parasites found in wild bobwhite quail from west Tennessee.

During July to October 1981, 28 bobwhite quail (Colinus virginianus) were trapped on Ames Plantation, Fayette County, Tennessee. The birds were killed, frozen and, at a later date, dissected and examined for internal parasites. The gastrointestinal tract, from pharynx to the cloaca, was systematically opened and examined under 8-15X magnification. Similarly the trachea and a small portion of the bronchi were removed and examined. A washing of the body cavity was also examined. The cecal worm, Heterakis bonasae, was the most common helminth encountered; it was found in every bird examined (mean no. of worms/bird=125.7). Probably the most significant pathology was caused by female Tetrameres pattersoni that were lodged in the secreting ducts of the proventriculus. T. pattersoni (both males and females) were in 46% of the birds. Other nematodes only infrequently recovered were Cyanea colini, Cheilispirura spinosa and Oispharynx nasuta. Rhabdometra odiosa, the only species of cestode encountered, occurred in three birds (11%). Two species of trematodes were found: Echinoparyphium sp. and Leucochloridium sp. To our knowledge, this is the first report of natural infections of these trematodes in bobwhite quail in North America.

TREAT, SARA-ANN F. Mangrove Systems, Inc.
--An overview of the shallow-water free-living marine Isopoda of Florida.

Florida represents a critical geographic area in the study of the distribution of Gulf and Caribbean Crustacea, but its isopod fauna has never been concisely summarized. For this reason, a checklist of species which have been reported and could be expected to occur in Florida has been compiled and is briefly compared with studies done in Georgia and Puerto Rico. Review of the literature indicates that approximately 50 species (excluding Epicaridea and deep-water taxa) have been reported from Florida; as many as 100 additional species might be expected to occur. Some commonly encountered taxa do not conform to descriptions of specimens from other locales. Range extensions and apparently discontinuous distributions are noted. Based on this preliminary survey, the isopod fauna of Florida includes diverse components of several geographic regions.

TUCKER, SHIRLEY C., and KITTIE DERSTINE.
Louisiana State University --
Unidirectional versus centripetal initiation of organs in leguminous flowers.

Two contrasting patterns of floral organ initiation have been found so far among legumes. The strongly zygomorphic flowers of several Papilionoideae (species of Lupinus and Sophora) and Caesalpinoideae (species of Caesalpinia and Parkinsonia) have unidirectional initiation in which sepals, petals and stamens are initiated on one side of the flower before any organs begin to form on the opposite side. In contrast, the radially symmetrical flowers of Calliandra portoricensis in the Mimosoideae display centripetal organ initiation. A second mimosoid, Mimosa pudica, however shows pronounced zygomorphy in calyx initiation, although subsequent events in development obscure these early differences in sepal size. A survey using scanning electron microscopy is under way to extend these findings to representatives of the 44 tribes of legumes in three subfamilies, as part of a search for the developmental bases for significant systematic criteria in the Leguminosae.

UPTON, STEVE J.,¹ WILLIAM L. CURRENT,¹ JOHN V. ERNST,² and SUSAN M. BARNARD.³
Auburn University,¹ U.S.D.A. Animal Parasitology Institute at Beltsville,² and Atlanta Zoological Park³--Caryospora simplex: Extra-intestinal development in mice.

An Ottoman viper, Vipera xanthina xanthina, at the Atlanta Zoo has been passing oocysts of Caryospora simplex for over 2 yrs. Oocysts obtained from the feces of this snake were inoculated orally into mice in order to determine if this coccidian has a heteroxenous life-cycle. Each of 60 mice were inoculated orally with 250,000 sporulated oocysts. At 2, 4, 6, 8, 12, 16, and 24 hrs, and 2, 4, 6, 8, 10, 12, 14, 16, 20, 25, 30, 35, and 40 days post-inoculation (PI), three mice were necropsied and selected tissues examined. Developmental stages of the parasite occurred in the dermis of the face and lamina propria of the tongue. Thin-walled, unsporulated oocysts were first seen 10 days PI. Fully sporulated oocysts were found on days 12, 14, and 16 PI and contained 8 sporozoites enclosed in a thin, sporocystic membrane. By day 16 PI, the sporozoites had left the oocysts and penetrated adjacent cells, where they remained dormant within a parasitophorous vacuole throughout the duration of the study. This investigation represents the third account of a heteroxenous life-cycle for a Caryospora sp.

URBATSCH, LOWELL E. and JAMES R. WUSSOW.
Louisiana State University--The Mexican and Central American species of *Calea* L. (Asteraceae, Heliantheae).

The genus Calea, established by Linnaeus in 1763, contains approximately 100 species and

grows at midelevations throughout the Neotropics. The only comprehensive study for the Mexican and Central American taxa is the 1896 revision by Robinson and Greenman who recognize 28 species comprising five subgenera. Subsequent investigators described 17 additional species. Recent studies suggest that Calea is too broadly circumscribed and contains elements that rightfully belong in at least four other genera. The present study provides an overview of Calea (sensu lato) and a taxonomic treatment for the typical elements in the genus. From among the more than 75 names attributed to Calea in Mexico and Central America, 18 taxa representing eight species and ten varieties are recognized. The name C. ternifolia HBK long thought to apply to a Colombian species is properly applicable to the Central and North American C. zacatachichi Schlecht. complex and takes precedence over it.

VANESSA, DAVIS O., REANOLD HAWKINS and SYED M. NAQVI. Southern University--Toxicities of selected pesticides (Cutrine-plus[®], Endosulfan, MSMA and Treflan) to freshwater zooplanktonic organisms.

Most pesticides ultimately reach natural bodies of water and may adversely affect the survival of zooplanktonic organisms. Their importance as primary consumers in an aquatic ecosystem is unequivocal. Pesticides used in this study were selected due to their broad range of toxic action. MSMA and Treflan are herbicides, Endosulfan is an insecticide and Cutrine-plus an algicide. The organisms were collected from a lake at Southern Univ. campus and acclimatized in the laboratory for 48 h. Freshly prepared aqueous stock solutions of pesticides were serially diluted to achieve desired concentrations. Filtered pond water was used to prepare test solutions. Mortality record for calanoids and cyclopoid copepods, ostracods and cladocerans was maintained separately for each group. Pesticide concentrations causing 100% mortality after 48 h are reported here. Endosulfan was the most toxic compound to all organisms. It caused 100% mortality in 1.0 ppb concentration. Treflan killed all organisms in the range of 0.3 to 10 ppm. Cutrine-plus caused absolute mortality in 20 ppm and MSMA ranged from 150-300 ppm for achieving similar mortality of zooplanktonic organisms. Generally, the cladocerans were most susceptible to all pesticides, followed by cyclopoids, calanoids and ostracods.

VIDRINE, MALCOLM F. and DARRYL R. CLARK.
Jefferson Davis Parish Mosquito Abatement District No. 1, and Coastal Zone Management, Louisiana Department of Natural Resources--A characterization of a freshwater mussel (Bivalvia: Unionidae) bed in a river in southwestern Mississippi.
West Amite River is a medium-sized stream

with a gravel and sand bottom. We sampled a 105 m² area in a small rivulet connecting two branches in the winding river approximately 1.5 miles north of the Louisiana border. The rivulet varied between three and five meters wide and had a mixed mud, sand, and detritus substrate. The mussel bed was not well formed, since mussels were spread about the area collected. We analyzed the area in order to characterize the species composition and relative abundance of the mussels present. Of the 610 mussels encountered, the species and their percentage of the total were: Elliptio crassidens (Lamarck 1819) 56.6%; Villosa lienosa (Conrad 1834) 16.6%; Lampsilis claibornensis (Lea 1838) 12.0%; Fusconaia flava group (Rafinesque 1820) 7.9%; Quadrula pustulosa group (Lea 1831) 1.5%; Elliptio beadliana (Lea 1861) 1.5%; Tritogonia verrucosa (Raf. 1820) 1.2%; Obovaria jacksoniana Frierson 1812 1.0%; O. unicolor (Lea 1845) 1.0%; Villosa vibex (Conrad 1834) 0.5%; and Lampsilis excavata Lea 1857 0.2%.

VIDRINE, MALCOLM F. Jefferson Davis Parish Mosquito Abatement District No. 1
--Verification of oviposition sites of two water-mites in the subgenus Polytax (Acari: Unionicolidae: Unionicola).

Unionicola serrata (Wolcott 1898) adults reside between the labial palps of freshwater mussels (Unionidae) in eastern North America (Canada to southern Mexico). Eggs are oviposited in the mantle and pedal epithelia proximal to the labial palps of the mussel hosts. Unionicola sp., an undescribed species that lives in the mantle cavity of Viviparus subpurpureus (Say 1829) (Viviparidae), oviposits in the mantle tissue proximal to the head of the snail hosts. These sites of oviposition are not distinct from those of the unionicolid subgenus Neotax, a group of mites that infest mussels in North America. Since the Polytax and the Neotax employ the same or similar tissues for oviposition, this could account for the development of their convergent characteristics. However, it is more likely that these two groups are consubgeneric.

WALDROP, RON D. Louisiana State University
--Characteristic Seasonal Conditions in Lower Barataria Bay, Louisiana.

Cycles of temperature, tide occurrence, tide depth, and salinity were analyzed with data from continuous meters installed on the north shore of Grande Terre Island, La. The data were summarized to exemplify seasonal conditions in lower Barataria Bay during six week periods in the spring, summer, and fall. The periods were chosen to correspond with spawning, migration and other physiological and behavioral changes of a number of aquatic residents in Barataria Bay and other estuaries. In the spring period the average salinity is 18.75±0.5133 ppt., the average temperature is 21.14±0.4177°C, the high tide occurs from 05:00-22:00 in 14 day cycles, and the tide

range varies from 0 cm during neap tide to 18 cm during spring tides from a mean depth of 85 cm. In the summer period the average salinity is 18.33±0.1023 ppt, the average temperature 28.60±0.2156°C, the high tide occurs from 04:00-13:00 in semilunar cycles, and the tide range varies similar to those of spring from a mean of 88 cm. The fall period average salinity is 18.96±0.5282 ppt, the average temperature 18.32±0.5719°C, the high tide occurs from 17:00-04:00 in semilunar cycles, and the tidal range is 18 cm from a mean depth of 93 cm. The daily high and low tide water temperature varies directly with solar heating. Photoperiods of 12L:12D, 14L:10D, and 10L:14D, were suggested by the author for simulation of each season respectively. Using these limits for the indicated environmental variables, seasonal behavior of aquatic species in Barataria Bay may be studied through laboratory simulation.

WALL, RICHARD L. Western Carolina University--Water chemistry of storm events in a virgin forest watershed.

The use of remote sensing instrumentation in two study streams draining forested watersheds in the Great Smoky Mountains National Park has shown that stream pH was depressed by up to one unit after storms. Precipitation at these locations had a low pH, usually less than 4.5. The chemistry of precipitation entering an ecosystem is altered in many ways as it passes through the system. Precipitation coming into a watershed interacts physically, chemically and biologically with components of the forest canopy, floor and soils. The primary objective of the present study is to determine the chemical composition of precipitation and any alterations in its ionic makeup as it passes through these compartments of the watershed. The study site is a virgin forest watershed in the Great Smoky Mountains National Park drained by Camel Hump Creek, a second-order stream. Four sampling stations for throughfall, litter and soil solutions (25 and 50 cm depths) were established on a single transect running upslope from the stream. Each compartment contained five sample replicates. Precipitation collectors were located in a clearing near the watershed. Stream samples were collected by hand. Sampling was carried out on a storm event basis from May to November, 1982. Concentrations of NO₃⁻, NH₄⁺, SO₄⁻², Cl⁻, PO₄⁻³, Na⁺, K⁺, Ca⁺², Mg⁺², Al⁺³ and H⁺ were determined. Preliminary results show occasional stream pH depressions greater than .5 pH units after storm events which may be related to changes in the levels of NO₃⁻ and/or SO₄⁻² in the streams.

WALLACE, J. W., CHAPMAN, M., SULLIVAN, J. E. and BHARDWAJ*, T. N. Western Carolina University and *Government College, Ajmer, India.--Polyphenolics of the Marsileaceae and their phylogenetic significance.

Species of the Marsileaceae represent a unique group of pteridophytes of question-

able origin. The polyphenolic profiles of representative species, which include flavanol-3-O-mono- and di-glycosides, C-glycosylflavones and C-glycosylxanthones, were demonstrated to have chemical features in common with the primitive leptosporangiate ferns, especially the Hymenophyllaceae. Intergeneric relationships in the family based on morphology, cytology, fossil evidence and the polyphenolic profiles indicate that Regnellidium is probably not a phylogenetic intermediate in a complex ion or reduction series between Marsilea and Pilularia. The current evidence indicates that Regnellidium was probably derived from Marsilea.

WALLS, SUSAN C. Mississippi State University--Female reproductive biology of two freshwater crustaceans from temporary forest ponds in Mississippi.

The female reproductive biology of an amphipod, Crangonyx sp., and an isopod, Caecidotea sp., was determined from weekly samples from two temporary forest ponds at Noxubee National Wildlife Refuge, Noxubee Co., MS between January and May 1982. Both genera occurred together in one pond, and Crangonyx occurred alone in the other. Egg size, clutch size, clutch volume and female body lengths were recorded, and the relationships between these parameters were examined. The oval eggs of Crangonyx averaged $0.32 \pm 0.03 \times 0.44 \pm 0.04$ mm and ranged from 12-118 ($\bar{x} = 51.3 \pm 27.4$)/clutch; round eggs of Caecidotea averaged 0.31 ± 0.04 mm in diameter and ranged from 39-199 ($\bar{x} = 95.0 \pm 45.7$)/clutch. Respective egg volumes ranged from $0.014\text{--}0.074$ mm³ ($\bar{x} = 0.031 \pm 0.01$ mm³) and $0.006\text{--}0.034$ mm³ ($\bar{x} = 0.016 \pm 0.007$ mm³).

WARE, STEWART, and ROLAND MONETTE. College of William & Mary--Early forest succession in the central Coastal Plain of Virginia.

Old field succession has not received the attention in the Coastal Plain that it has in the Piedmont. We studied 19 stands 20 to 150+ years old using the point-centered quarter method for trees and for saplings and 1 m radius circles for seedlings. Loblolly pine is the overwhelmingly dominant first tree invader of old fields. Sweetgum is the most important early hardwood invader but its understory importance under pine does not translate into overstory importance, presumably because of heavy mortality. White oak becomes the first post-pine dominant. In the oldest stands, beech is the leading dominant. Though still an important co-dominant in such stands, white oak is not important in the sapling layer, so it may not persist in the future. Virginia pine is very rare in old field stands, though fairly common in post-timbering succession. In a few sites tuliptree invades old field stands simultaneously with sweetgum and equals it in importance, but high abundance of tuliptree in the area results from abundant invasion after timbering disturbance rather than a

major role in post-cultivation succession. Southern red oak reproduces in the late pine stage but persists in the white oak-dominated stands only as a canopy relict. Hickories are present throughout the sere but are never structurally important. The endpoint of old field succession in this area is not oak-hickory; it bears a clear resemblance to the beech- and white oak-rich Southern Mixed Hardwood Forest of further south.

WATSON, FRANK D. North Carolina State University--A Reconsideration of Cytological Evolution in the Pinales.

The common assumption that $n=x/2$ represents the basic chromosome number in the gymnosperms is reexamined. Modern evidence indicates that the major groups of "gymnosperms" are related only by the shared condition of gymnospermy. For this reason the group represents an evolutionarily unnatural assemblage. This realization removes one major supporting point (i.e., that common equals primitive) from the assertion that $n=x/2$ is primitive in the gymnospermous groups. It additionally implies that future speculation concerning cytological trends or basic chromosome numbers be restricted to a group by group basis. Available evidence from the Pinales (including Taxales) and Cycadales illustrates that most previous workers have implicated two major cytogenetic processes (descending aneuploidy and centromeric fusion) in evolutionary considerations at the family level. An across-the-board reversal of these same trends indicates that a more parsimonious, heuristic, and testable hypothesis of cytological evolution in the Pinales exists. The hypothesis is supported by a strong positive correlation (evolutionary trend?) between increasing chromosome number and nuclear DNA content in the more recently evolved families, and derives further support from other available sources.

WESTON, D. P. McNeese State University, Lake Charles, LA. --Recovery of the Louisiana shelf crustacean community following mass mortality: natural vs. experimental comparisons.

A two year study of the continental shelf off Cameron, Louisiana revealed dramatic seasonal fluctuations in the abundance and species richness of the macrobenthic crustacean community. These fluctuations were largely attributable to periods of hypoxia in the bottom waters during the summer months, which reduced the diversity and density of the decapod fauna and entirely eliminated both the amphipods and cumaceans. Following the cessation of the hypoxic event, the community gradually recovered with the greatest diversity attained in the spring. The recovery of the crustacean community following hypoxia-induced mortality was duplicated in artificially defaunated substrate. Sediment collected on the continental shelf and defaunated by freezing was placed on the bottom in 10 m of water.

The recolonization of crustaceans and other macrofauna was monitored over a five month period. A comparison of the recolonization of artificially defaunated sediments with that of sediments naturally defaunated by hypoxia revealed significant differences in both species succession and length of time required for recolonization. These differences can be attributed to the scale of disturbance, experimental artifacts, and the seasonality and/or patchiness of recruitment.

WHARTON, CHARLES P. Institute of Ecology, University of Georgia--Bottomland hardwood forests of the Southeast.

This paper summarizes the literature and field studies of bottomland hardwoods (BLH) in NC, SC, GA and FL. Functional floodplain features include channels, flats, backswamps, point bars, ridges and swales, dune deposits, scour channels and hummocks. Some of these features are of Pleistocene origin. Alluvial, blackwater, springfed, bog and bog-fed stream types are recognized. While nutrients are higher on floodplain than upland sites, some zones have reduced availability, approaching both eutrophic (660 ppm Ca) and oligotrophic (44 ppm Ca) conditions. Residence time of water on floodplain, depth and duration of flooding, anaerobic gradients, distance from channel and geologic substrate strongly influences the physicochemical environment. Plant communities are organized into field-practical zones adopted by National Wetland Technical Council (NUTC) from Zone I (aquatic) through Zones II-V (BLH) to Zone IV (upland). The fauna varies between zones and also longitudinally as between tidal and non-tidal river sections. Trophic relationships are divided into wet-system and dry-system pathways. River productivity is heavily dependent on processes in BLH zones. Each NUTC Zone has its own contribution to total floodplain ecology. BLH systems are functionally coupled with headwaters, tributaries, deltas, estuaries and uplands by hydrologic, chemical and biotic pathways.

WHITE, JOANN and MONTE LLOYD. University of North Carolina--Massospora cicadina conidial infections in emerging periodical cicada (Homoptera: Cicadidae Magicicada) nymphs.

Periodical cicada nymphs (Cicadidae: Homoptera: Magicicada) that were collected as they emerged from the ground then isolated in individual containers with their exuviae developed infective conidia of the fungus, Massospora cicadina Peck. Neither the length of time required for the cicada's abdominal tergites to fall off, i.e., the animal became infective to other animals, nor the proportion of males and females developing the infection differed between the sexes. Negative correlations were found between the proportion of individuals infected and the length of time since the habitat was last disturbed, and between the proportion infected and

the number of emerging cicadas per m². Cicadas in one of the six study sites had been studied in the prior emergence--17 years ago--and provided us the opportunity to determine what, if any changes had occurred in the density, and what, if any changes had occurred in the adult infection rate. Our data show that the density dropped by one half in the intervening period, the resting spore rate increased by 9 fold and the conidial producing rate increased by 2 fold. These data suggest possibilities for use of the fungus as a biological control agent of periodical cicadas.

WIERSEMA, JOHN H. University of Alabama --A numerical taxonomic assessment of Nymphaea subgenus Hydrocallis.

Data on 49 taxonomic characters were garnered from 156 populations represented by one or more herbarium specimens and from 53 field populations of Nymphaea subgenus Hydrocallis. Seventeen type collections of Hydrocallis taxa were included. These data were subjected to cluster analysis using the NT-SYS statistical package. Field data were also analyzed separately, with four additional characters incorporated into the data set. The resultant phenograms distinguish thirteen entities, corresponding to N. jamesoniana, N. blanda, N. gardneriana, N. tenerinervia, N. amazonum, N. rudgeana, N. oxypetala, N. belophylla, and five apparently un-named taxa. Although the larger data set failed to generate a completely acceptable separation of N. blanda, N. gardneriana, and one of the un-named taxa, the analysis of field data improved the resolution of these taxa. Field data were also helpful in understanding complicated variation patterns in N. amazonum and in another of the un-named taxa. "This abstract is based upon work supported by the National Science Foundation under Grant No. DEB-8111024."

WIERSEMA, JOHN H. University of Alabama--Seed morphology of Nymphaea subgenus Hydrocallis and its phylogenetic significance.

Seeds of ten tropical American taxa of the nocturnally-flowering Nymphaea subgenus Hydrocallis were examined with light microscopy and scanning electron microscopy. Four additional Nymphaea species representing three additional subgenera were similarly examined. Among members of subgenus Hydrocallis differences in size and shape of seeds were observed and four general patterns of variation in surface morphology were recognized. These variations are in: 1) length of surface papillae, 2) arrangement of surface papillae, 3) spatial distribution of surface papillae, and 4) shape of surface sclereids. From an analysis of this variation Hydrocallis taxa can be assigned to three principal groups, with some of these composed of two or more subgroups. The seed morphology of one of these groups is considered primitive within subgenus Hydrocallis based on comparisons with other Nymphaea subgenera. "This abstract is based upon work supported by the National Science Foundation under Grant No. DEB-8111024."

WILLIAMS, LOUIS G. University of Alabama — Assessment of the professional management for developing, researching, teaching and enforcing envirc-ecologic regulations for use by applied aquatic ecologists.

Assessment of the current and emerging status of science and technology in the Southeast, with special emphasis on the biologic applications of aquatic programs; how regulations come into being, how they are/are not enforced, modified to be more or less restrictive by ethic and legal considerations, including the mass orchestration by state, regional, national and international special interests, and what beneficial influence may be exerted by aquatic ecologists.

WILLIAMS, RAY S. and J. FRANK RANDALL. Appalachian State University--Avian predation of prepupae of *Diprion similis* (Hartig).

The larva of the introduced pine sawfly, *Diprion similis*, feeds on the needles of the Eastern White Pine, *Pinus strobus* (Linnaeus). The larvae spin cocoons and enter a prepupae stage where they are possible prey for birds. This study, in Avery County, N.C., attempted to determine to what extent birds prey on prepupae and which species are the major predators. Cocoons were collected and examined for evidences of predation and direct observation of birds opening cocoons were made. Of 33,840 cocoons examined 29.6% showed signs of being altered by birds. Black-capped Chickadees, Carolina Chickadees, and the Tufted Titmouse were observed pecking cocoons more often than other birds.

WILLIAMSON, G. BRUCE. Louisiana State University--Are tropical trees clumped? Pattern analysis of *Hymenaea courbaril* L. (Leguminosae) at a mature dry forest site in Costa Rica indicates that individuals are evenly spaced among quadrats smaller than twenty-five square meters and randomly spaced in larger quadrats. These results contradict Hubbell's (1980) contention that dry forest trees are clumped and support Janzen's (1970) and Connell's (1970) hypothesis that seed and seedling predation around parent trees results in a hyper-dispersed pattern of recruitment of new adults. The results here are particularly relevant because the study site is adjacent to sites studied by Hubbell and Janzen.

WILLIG, MICHAEL R.,¹ THOMAS E. LACHER, JR.,² and MICHAEL A. MARES.³ Loyola University,¹ West Washington State University,² and Stoval Museum of Science and History³ -- Species-area relations: an empirical evaluation of the linearity assumption in island avifaunas.
The equilibrium model of island biogeography

as proposed by MacArthur and Wilson assumes a linear relationship between the log of species richness and the log of island area. This assumption has never been empirically evaluated. Nonetheless, biological meaning has been ascribed to both the slope and intercept of straight lines determined by least squares analyses for a variety of data sets. Utilizing replicate data on breeding birds on islands in a lake, we show through analysis of covariance and analysis of variance that, although there is a significant linear component in the regression of species number on island area, the data in fact significantly deviate from a linear model. The straight-line relationship of the MacArthur-Wilson model is a product of a complex series of biological assumptions concerned with the processes of immigration, emigration, competition and extinction. Our results, however, do not support such a linear model and therefore call into question one or more of the equilibrium model's biological components.

WINSTEAD, JOE E. Western Kentucky University--Changes in a climax forest in South Central Kentucky after ten years (1972-82).

Analysis of a hardwood forest in Barren County, Kentucky ten years after its definitive study indicates that a 25% reduction in density has occurred coupled with a 10% reduction of total basal area. A 1982 study of permanent plots established in the system during 1972 provided information on growth rates showing that *Quercus alba* and *Liriodendron tulipifera* maintained active annual growth while *Carya ovata* and *Nyssa sylvatica* extinction rates contributed to the density reduction. Diameter measurements of individual trees compared with measurements made 10 years earlier showed a potential growth increment increase equivalent to 4.850 m³ ha⁻¹ of surviving individuals after 10 years. Dominated by *Quercus alba* the forest system may be showing a minor shift to supporting more *Liriodendron tulipifera* and *Fagus grandifolia* associated with a reduction of *Carya ovata*, *Nyssa sylvatica* as well as *Liquidambar styraciflua*.

WOFFORD, B. EUGENE. University of Tennessee, Knoxville--A new *Lindera* (Lauraceae) from North America.

The genus *Lindera* (Thunb.), composed of ca. 100 species, is primarily of eastern Asia, with only three species in North America. *Lindera benzoin* (L.) Blume, the most common species, ranges throughout the eastern U. S. *Lindera melissifolia* (Walt.) Blume, a rare and local species, is presently known from the Coastal Plain of the Carolinas, Georgia, Mississippi, Arkansas, and Missouri. A new species, *L. subcoriacea* Wofford (in press), is restricted

to permanently wet, peaty, evergreen shrub bogs on the Gulf Coastal Plain of Mississippi and Louisiana. The salient features for recognizing this taxon include subcoriaceous, elliptic to oblanceolate leaves, obtuse to rounded at the tip, less than 7.5 cm long and faintly aromatic.

In addition, it is geographically isolated and exhibits phenological characters preventing gene exchange with either L. melissifolia or L. benzoin. Both L. melissifolia and the new taxon are quite rare and in need of protection and habitat management.

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ASB Candidates for Office—1983

The Nominating Committee, composed of George Ransour, Leland Shanor, and Chairman Franklin Flint, has selected the following slate of nominees for the ASB offices to be filled this year. Additional nominations will be received from the floor. Voting will take place at the Annual Business Meeting Friday morning. Please plan to attend.

President-Elect:—**Joseph Charles O'Kelley**, University of Alabama

—**J. Kenneth Shull**, Loyola University, New Orleans

Vice-President:—**Mary C. Dunn**, Middle Tennessee State University

—**James F. Matthews**, University of North Carolina, Charlotte

Treasurer:—**Robert L. Beckmann**, North Carolina State University

—**Diane R. Nelson**, East Tennessee State University

Executive Committee:—**William H. Martin**, Eastern Kentucky University

(two positions) —**Robert H. Mohlenbrock**, Southern Illinois University

—**Joe E. Winstead**, Western Kentucky University

PRESIDENT-ELECT



Charles O'Kelley



Kenneth Shull

J. Charles O'Kelley—Dr. O'Kelley is Research Professor of Biology at the University of Alabama. He received the A.B. and M.A. degrees (1943, 1948) in Botany at the University of North Carolina and the Ph.D. degree (1950) in Plant Physiology at Iowa State University. In 1953 he was an NSF Postdoctoral Fellow in the Botany Department of the University of Wisconsin and in 1965 he was an NIH Special Fellow in the Biology Department of the Johns Hopkins University. He has been a member of the Faculty of the University of Alabama since 1951 and was Chairperson of the Biology Department 1970–74. His teaching responsibilities are mostly in the area of cell biology. His research interests lie in the general area of algal physiology. More specifically he has worked on problems of algal nutrition, pesticide resistance, cell synchrony, and morphogenesis in the algae. He is a member of a number of professional societies, primarily those that deal with plant physiology and phycology. He has served as Chairperson of the Southeastern Section of the Botanical Society of America (1961) and Chairperson of the Southern Section of the American Society of Plant Physiologists (1963). He became a Fellow of AAAS in 1960. He served as Public Responsibility Representative for the State of Alabama to A.I.B.S. (1972–77). He has served on several ASB Committees; these include the Student Travel Awards Committee (1962–65), the Research Awards Committee (1970–73), and the Executive Committee (1974–77). In 1970 he was a co-recipient of the ASB Research Award. He is currently Treasurer of the Association.

J. Kenneth Shull, Jr.—A native of Anniston, Alabama, Dr. Shull earned a B.S. in Chemistry from the University of Alabama in 1963 and in 1967 he received an M.S. in Biology from the same institution. He earned a Ph.D. in Genetics from Florida State University in 1973 where he was a recipient of an NIH Genetics Traineeship as well as research and teaching assistantships. He has worked as an electron microscopist in parasitology and is currently an Associate Professor of Biology at Loyola University, New Orleans, where he has been on the faculty since 1973. Dr. Shull's research interests are in the area of chromosome homology, nuclear cytology during meiosis, and the cytotaxonomy of the genus *Lilium*. He serves as the pre-dental adviser at Loyola, is Chairman of the Faculty Development Committee, and is a member of the Loyola Speaker's Bureau. He serves on the Committee for Protection of Human Subjects at Xavier University and has participated in the Southeastern Seminar Circuit. As a member of ASB since 1970, Dr. Shull has chaired the 1978 Travel Awards Committee and the 1981 Research Awards Committee and was co-organizer of the 1981 ASB Genetics Symposium. He organized and chaired the 1982 ASB Symposium on Ecological Genetics. He currently serves as Vice President. Dr. Shull is also a member of the Genetics Society of America, the Genetics Society of Canada, AAAS, Sigma XI, and the Lily Society of America.

VICE-PRESIDENT

Mary C. Dunn—A native of Iva, South Carolina, Dr. Dunn earned the B.S. in Biology from Winthrop College in 1945, and the M.S. in Zoology from the University of Michigan in 1947. The Ph.D. in Zoology (Parasitology) was conferred by the University of Georgia in 1957. She was the recipient of a predoctoral National Institutes of Health Fellowship in 1956–57. She has worked for Parke, Davis and Company, Columbia University, and Shorter College, and is currently Professor of Biology at Middle Tennessee State University where she has taught since 1965. Dr. Dunn's research interests are in the area of trematode life cycles and morphology. She is a member of the ASB Executive Committee and she serves on the Membership Committee. She is a member of AAAS (Fellow), American Society of Parasitologists, American Society of Tropical Medicine and Hygiene, American Microscopical Society, Tennessee Academy of Science, Southeastern Society of Parasitologists (Secretary-Treasurer, 1969–present), Beta Beta Beta, Phi Sigma, and Sigma Xi.

James F. Matthews—Dr. Matthews is Professor of Biology and Director of the Herbarium in the Department of Biology, University of North Carolina at Charlotte. He received the B.A. degree from Atlantic Christian College (1957), the M.S. degree from Cornell University (1960), and the Ph.D. from Emory University (1962). His research interests have included the vegetation of granite outcrops, floristics, and species biology of endangered and threatened species. Dr. Matthews has served as Chairman, Southeastern Section of the Botanical Society of America (1977–79), President of the Southern Appalachian Botanical Club (1980–82), and on the Executive Committee of ASB (1980–83). He has served on the N.C. Natural Areas Advisory Committee since 1973, served as Chairman (1980–82), and recently was appointed Chairman of the newly constituted N.C. Natural Heritage Advisory

Committee. He has been a member of ASB since 1960, and has edited the Index of Current Plant Systematic and Ecological Research in the SE. U.S. in *ASB Bull.* 27(4) and 28(4).

TREASURER

Robert L. Beckmann—Dr. Beckmann is Associate Professor of Botany at North Carolina State University, Raleigh. He received both the B.A. and Ph.D. degrees from Vanderbilt University. Prior to his appointment at North Carolina State University in 1976, he taught in the biology departments of the University of Tennessee (Nashville) and George Peabody College. His primary teaching interests are in undergraduate interdisciplinary biology courses and graduate botany courses. For excellence in undergraduate instruction, he was elected in 1982 to the Academy of Outstanding Teachers at North Carolina State University. His current research involves biosystematic investigations of representatives of the genera *Fraxinus* and *Ipomoea*. He has received grant support from the Forest Service (USDA) and the North Carolina Board of Science and Technology in his studies of the polyploid complex of white ash (*Fraxinus americana*). He received the ASB Research Award in 1982 for his paper on *Ipomoea pandurata*. He has been an active member of the ASB for over 10 years, and served last year as the Chairman of the Graduate Awards Committee. He is a member of several scientific societies, including the Botanical Society of America, the American Society for Plant Taxonomists, the Southern Appalachian Botanical Club, and Sigma Xi.

Diane R. Nelson—Dr. Nelson is Professor of Biological Sciences at East Tennessee State University, where she has taught since 1968. She received her B.S. in Secondary Education (Natural Science) and her M.S. and Ph.D. in Zoology from the University of Tennessee–Knoxville. Her research interests involve the ecology and systematics of the Tardigrada (water bears), and she is the editor of the *Proceedings of the Third International Symposium on the Tardigrada*, which was hosted by ETSU in 1980. A member of several scientific societies, Dr. Nelson has served the Tennessee Academy of Science as Secretary, member of the Executive Board, Visiting Scientist, and Section Chairperson. As a member of ASB, she has served as Section Chairperson and on the Conservation Committee and the Research Awards Committee.

EXECUTIVE COMMITTEE

William H. Martin—Dr. Martin is Director of the Division of Natural Areas of Eastern Kentucky University, Richmond, Kentucky, with responsibility for management, research projects, and development of natural areas under the stewardship of the University. He is also Professor of Biology at Eastern and an adjunct professor of the graduate faculty at the University of Kentucky. He received the B.S. degree (1960) from Tennessee Technological University, Cookeville, Tennessee, and the M.S. (1966) and Ph.D. (1971) degrees in Botany from The University of Tennessee at Knoxville. Dr. Martin is a member of the Ecological Society of America (Secretary-Treasurer of the Southeastern Chapter, 1980–82), AAAS, AIBS, Sigma Xi, the Southern Appalachian Botanical Club (Vice President, 1980–81), and the Tennessee and Kentucky Academies of Science (Chairman of the Botany Sections in both state academies 1975 and 1976–78). He was Director of the Kentucky Junior Academy of Science and a member of the KAS Executive Committee 1972–75. Dr. Martin has been an active member of ASB since graduate school. In addition to presenting papers in the plant ecology sessions and ecological symposia, he has co-chaired symposia at annual meetings of ASB. He has also served on and chaired the ASB Conservation Committee (1979–82). He was Local Arrangements Chairman for the 1982 meeting at Eastern Kentucky University. Dr. Martin's research and teaching interests are in vegetation ecology, with emphasis on upland deciduous forest and grassland ecosystems. For the past several years, he has concentrated on studies of vegetation structure and dynamics of forests and grasslands of the Kentucky portion of the Appalachian Plateau and Interior Low Plateaus. As an active conservationist, he has been a consultant on preserving natural areas for the Nature Conservancy and the National Natural Landmark Program of the U.S. Department of the Interior.

Robert H. Mohlenbrock—Dr. Mohlenbrock, a native of Murphysboro, Illinois, was educated at Southern Illinois University and Washington University, St. Louis (Ph.D., 1957). He has been on the

faculty in the Department of Botany at Southern Illinois University at Carbondale for twenty-six years, sixteen of which he served as Chairman of the Department. During that time, sixty-one graduate students have finished under his direction. He received the Great Teacher Award from Southern Illinois University in 1978. Dr. Mohlenbrock is author of more than 250 publications, including 28 books, ten of which are in the projected 40-volume *Illustrated Flora of Illinois* series. He has worked for many years on the systematics of tropical legumes. His most recent book on endangered species of plants, entitled "Where Have All the Wildflowers Gone?", will be published this spring by Macmillan Publishing Company. He has been President of the Southern Appalachian Botanical Club (1979-80) and a member of ASB since 1976.

Joe E. Winstead—Dr. Winstead is a native of Wichita Falls, Texas and received his B.S. in Biology from Midwestern University (1960) in Wichita Falls and the M.S. in Botany at Ohio University in 1962. After military service he completed the Ph.D. in Botany at the University of Texas, Austin in 1968 and joined the faculty at Western Kentucky University where he is now Professor of Biology. He is a member of the Ecological Society of America, Botanical Society of America, Sigma Xi, Southern Appalachian Botanical Club, and is Vice President and a member of the Board of Directors of the Kentucky Academy of Science. He also serves as Chairman of the Kentucky Academy of Science Foundation for Botanical Research. His teaching areas include undergraduate ecology courses and a graduate course in plant ecology. He has been a staff member for 11 consecutive years at the Tech Aqua Biological Field Station working through the Tech Aqua Consortium. Research efforts have involved both autecological and synecological problems. Extensive work has involved the populational differentiation in *Liquidambar styraciflua* from the United States and Mexico and eastern U.S. populations of *Acer negundo* and *Xanthium strumarium*. Current research involves the adaptive mechanisms of plants to coal strip mine spoils. He has been an ASB member for 11 years.

News of Biology in the Southeast

JON R. FORTMAN—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

The University of Alabama, Department of Biology. *Dr. Eldon Blancher* (Ph.D., Univ. of Florida) has joined other biology faculty as an Assistant Professor. *Dr. Marvin Roberts* (Ph.D., Ohio State Univ.) was recently appointed Post-Doctoral Research Associate in the laboratory of Dr. Robert R. Haynes. *Dr. Gordon Ulsch* has been named Coordinator of the Aquatic Biology Program.

Tuskegee Institute, Department of Biology. During the past year, an Alabama Society for Electron Microscopy was formed. Anyone interested in biological or materials research, utilizing either scanning or transmission electron microscopy, is invited to join. Please contact Mrs. Carol S. Williams, Dept. of Biology, Tuskegee Institute, Tuskegee Institute, AL 36088 for additional information.

Florida

University of Miami, Rosenstiel School of Marine and Atmospheric Science. *Dr. Alan Berman*, Dean of the School, has announced the appointment of *Samuel C. Snedaker* to the position of Chairman of the Division of Marine Affairs. This Division was established to undertake research, education, and technology-transfer programs in those areas of marine science that involve an integration of basic and applied research with natural resource policy and management. Dr. Snedaker, a systems ecologist, came to the School in 1975 from the University of Florida. Professor Snedaker's research is in coastal zone management problems in the United States and abroad.

Kentucky

Western Kentucky University, Department of Biology. The Kentucky Department of Fish and Wildlife Resources will determine its future management goals and programs based on a public survey by *Dr. Robert Hoyt*, Professor of Biology. Dr. Hoyt was chosen to develop and conduct two separate questionnaires, and through Western's Office of Academic Computing and Research Services, will begin tabulating results next month. One survey polls 10,000 fishermen selected randomly from more than half-a-million Kentuckians who purchased fishing or combination fishing-hunting licenses in 1981. A second survey is looking for wildlife and environment attitudes from 1300 Kentuckians.

Louisiana

Loyola University of the South, Department of Biological Sciences. *Dr. Michael Willig* spent the summer at the El Verde Field Station of the University of Puerto Rico. He has also been appointed a Research Associate of the Audubon Park Zoological Garden in New Orleans.

Louisiana State University, Baton Rouge, Department of Botany. The department welcomes two new faculty members, *Dr. Thomas S. Moore, Jr.*, Chairman, and *Dr. G. Bruce Williamson*, Assistant Professor. Dr. Moore's research interest is cellular membrane origins. Dr. Williamson's interests deal with the ecology of tropical forests and fire maintained ecosystems. The department expects to have additional research and teaching assistantships available for the Fall of 1983. Prestigious Alumni Federation Graduate Fellowships are also available for qualified applicants for study toward the Ph.D. These Fellowships provide a tax free \$10,000 stipend per year with exclusion from University fees.

For further information contact: Dr. David Longstreth, Department of Botany, LSU, Baton Rouge, LA 70803.

Mississippi

Gulf Coast Research Laboratory, Ocean Springs. The GCRL is providing the National Cancer Institute with information regarding the toxicological, cellular, and biochemical responses of several species of laboratory-reared fishes to a composite of water-borne chemicals. *Dr. Robin M. Overstreet*, head of the parasitology section, *Dr. William E. Hawkins*, head of the microscopy section, *Dr. William W. Walker*, toxicology group leader, and *Dr. Adrian R. Lawler*, experimental organism culture group leader, are working together on the project.

North Carolina

St. Mary's College, Department of Science. *Dr. Janice C. Coffey*, Chairman of the Department, participated in a cross-cultural seminar for seven weeks in India during this past summer. The seminar, a combination travel-study program, addressed the "Impact of Science and Technology on Society."

East Carolina University, Department of Biology. The local chapter of Sigma Xi sponsored a Symposium on Phosphate and Peat Resources of North Carolina in October. The symposium focused on the scientific support for the evaluation and orderly development of these extensive and valuable resources. *Mark Brinson*, current President of the local chapter, was one of the speakers.

Tennessee

Middle Tennessee State University, Department of Biology. *Dr. Wayne C. Rosing*, Assistant Professor of Biology, attended the 33rd Annual AIBS meeting at Penn. State University. A recent publication of his on the ultrastructure of ascus and ascospore development in *Chaetomium brasiliense*, appeared in *Mycologia*.

Austin Peay State University, Biology Department. *Dr. Charles N. Boehms* has returned to full-time teaching as Professor of Biology after serving fourteen years as Vice President for Student Affairs. He will be teaching physiology and freshwater biology.

Tennessee Technological University, Tech Aqua Upper Cumberland Biological Station. The Station is pleased to announce its schedule for the summer session of 1983. The Station is located on Center Hill Reservoir near Smithville, Tennessee, on a 550 acre peninsula, giving access to the entire Center Hill Reservation of 20,000 acres of land, and 415 miles of shoreline for instruction and research. Year-round living facilities are available for aquatic and terrestrial research. The following courses will be taught from June 5–July 8, 1983: Field Botany, *Dr. Gary Morton*, University of Tennessee at Chattanooga; Ornithology, *Dr. Herbert Shadowen*, Western Kentucky University; Ichthyology, *Dr. Frank Bulow*, Tennessee Technological University; Freshwater Invertebrates, *Dr. Charles McGhee*, Middle Tenn. State Univ. Courses being taught from July 10–August 12 are: Ecosystems Analysis, *Dr. Joe Winstead*, Western Kentucky Univ.; Herpetology, *Dr. George Murphy*, Middle Tennessee State Univ.; Dendrology, *Dr. Ronald Jones*, Eastern Kentucky Univ.; Biology of the Chironomids, *Mr. Bill Beck*, Prof. Emeritus Florida A&M. For further information contact: *Dr. Henri G. Willard*, Assistant Director, Upper Cumberland Biological Station at Tech Aqua, Box 5041, Tennessee Technological University, Cookeville, TN 38501.

Memphis State University, Department of Biology. *Dr. Stephen J. Klaine* (Ph.D., Rich University) will fill the position of environmental toxicologist. His dissertation research concerned the control of the noxious aquatic weed, *Hydrilla verticillata*, through life cycle interruption. The department is currently in the proposal and approval stage of developing an undergraduate concentration in toxicology within the biology major. *Dr. Klaine* will coordinate this program, and teach the toxicology courses involved, as well as develop a graduate research program in environmental toxicology. *Dr. Lewis Coons* (electronmicroscopist) and *Naomi Roberts* attended the VI International Meeting of Acarology in Edinburgh, Scotland. *Dr. Coons* co-authored a paper given at the meeting entitled "Ultrastructural changes in type I alveoli of salivary glands from hydrating and desiccating lone star ticks.

Virginia

Virginia Commonwealth University, Biology Department. *Dr. Martha D. Berliner*, formerly Professor of Biology at Simmons College, Boston, is now serving as Chairman of the Department of Biology. *Dr. G. C. Llewellyn*, Associate Professor, has recently returned from Vienna, Austria where he delivered a paper as an invited participant at the Mycotoxins and Phycotoxins Symposium.

University of Virginia, Mountain Lake Biological Station. Field biology Post-doctoral fellowships are available for summer research at the Station. These awards, funded by the University, are for the purpose of promoting field research by young investigators who have recently received their Ph.D. degree. Proposals will be considered for a wide variety of ecological and evolutionary studies. The stipend is \$1900, and the deadline is 1 April 1983. Write to: Director, Mountain Lake Biological Station, Gilmer Hall, University of Virginia, Charlottesville, VA 22901.

Old Dominion University, Department of Biological Sciences. *Dr. Lytton Musselman*, Associate Professor, is on a one-year leave of absence to August 1983. He has a Fulbright Award to study parasitic plant infections in the Sudan, Africa. The department announces a new Ph.D. Program in Ecological Sciences. For more information contact: *Dr. Frank P. Day, Jr.*, Director, Ecological Sciences Ph.D. Program, Department of Biological Sciences, Old Dominion University, Norfolk, VA 23508.

University of Richmond, Department of Biology. *Joseph C. Mitchell* received his Ph.D. from the University of Tennessee, Knoxville, August 1982.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

University of Florida, The Florida State Museum. *Dr. Walter Auffenberg*, Curator in Herpetology, his wife and two of his sons, went to the Philippines in June 1982, and will remain there until January 1984. They will be continuing their comprehensive study of Gray's monitor lizard, an animal thought to be extinct for over a hundred years. *Dr. Oliver L. Austin, Jr.*, Curator Emeritus in Ornithology, is revising his books "Families of Birds" and "Birds of the World," which will be republished in the near future. *George Burgess*, Senior Biologist in Ichthyology, is working with *Stewart Springer* on a review of the squalomorph sharks of the western Atlantic, and with *Dr. Carter R. Gilbert* and *Dr. Ralph Yerger* (Florida State University) on a book on the freshwater fishes of Florida. *Dr. Mary Clench* is a director of the National Audubon Society. *Dr. Edward S. Deevey*, Graduate Research Curator of Paleocology, was recently elected a member of the National Academy of Sciences. He is also continuing work on the "Historical Ecology of the Maya Area" with *Dr. Barbara Leyden* and *Mark Brenner*, who will use his work on the project for his Ph.D. dissertation. *Dr. John F. Eisenberg*, Ordway Chair in Ecosystems Conservation, joined the staff in September 1982, and is developing a program in the radiotelemetry of small carnivores with *Dr. Melvin S. Simquist*. *Richard Franz*, Associate in Natural Sciences, is curating the newly established crustacean collection and was a participant in an invited symposium on crustacean biology dedicated to *Dr. Horton H. Hobbs* (Smithsonian Institution, National Museum of Natural History). *Dr. Carter R. Gilbert*, Associate Curator in Ichthyology, is working on a chapter to be included in "The Zoogeography of the Southeastern Area," and is revising the chapter on fishes in "Standard Methods of Biological Examinations." *Dr. Gilbert* is the editor of the Southeastern Fishes Council Proceedings and serves as secretary of the American Society of Ichthyologists and Herpetologists. *Dr. David Hall*, Associate in Botany, is currently working on a book, "The Grasses of Florida." *Dr. John William Hardy*, Curator in Ornithology, was an invited participant in the International Ornithological Congress in Moscow, USSR, in August 1982. *Dr. Hardy* will lead a Nature Tour over the '82 Christmas holidays to Egypt and Kenya. *Dr. F. Wayne King*, FSM Director and Joint Curator in Herpetology, is serving as Deputy Chairman of the Species Survival Commission of IUCN and as Chairman of the Crocodile Specialist Group. *Dr. Bruce J. MacFadden*, Associate Curator in Vertebrate Paleontology, is finishing his monograph on the revisions of hipparions. *Jacqueline Y. Miller*, Associate in Entomology, is the Associate Editor of the *Allyn Museum of Entomology Bulletin* and is working toward her Ph.D. degree. *Dr. Lee D. Miller*, Curator in Entomology, is the Editor of the *Bulletin*. *Gary Morgan*, Collections Manager, recently published a monograph on Eocene sea cows with *Daryl P. Domning* (Howard University).

and *Clayton E. Ray* (Smithsonian Institution). *Dr. John G. Robinson*, Adjunct Assistant Curator in Primatology, has been working in Venezuela since 1977 on a large population of wedge-capped capuchin monkeys. *Dr. Fred G. Thompson*, Curator in Malacology, in collaboration with *Peter Dance* (Great Britain) will collect land snails in the Kalimantan District, Borneo. They will be the first malacologists to collect and study specimens from that country. *Dr. S. David Webb*, Curator in Vertebrate Paleontology, is working on the fauna of the Thomas Farm Site, Gilchrist County, Florida, and is preparing for the 2nd Annual Thomas Farm Field Camp to be held in June, which is open to all interested persons. This summer he attended both the International Theriological Conference in Helsinki, where he presented a paper on the Interamerican faunal interchange, and the International Quaternary Conference in Moscow, USSR, where he co-chaired a session on fossil mammals. *Dr. Kenneth T. Wilkins*, Postdoctoral Research Associate, finished his doctoral dissertation in May 1982 and is preparing portions of it for publication. *Dr. Charles A. Woods*, Chairman, Department of Natural Sciences, and Curator in Mammalogy, will return to Haiti to continue his studies on rodents. The Allyn Museum of Entomology, which has more than 750,000 butterflies, was donated to the University of Florida Foundation and the FSM by *Arthur C. Allyn, Jr.* The gift includes the building currently housing the Museum, the land it stands on in Sarasota, laboratory equipment, an automatic storage system, and an 1100 volume library. Together with the collections already at the University, FSM has the most comprehensive butterfly collection in the Western Hemisphere, a total of nearly 1.5 million specimens that include 90% of the 16,000 known butterfly species. The combined collections comprise one of the five largest in the world and make the University of Florida a major butterfly research center.

Fairchild Tropical Garden, Miami. A conference on South Florida's Native Plants, co-sponsored by Fairchild Tropical Garden, and the Dade County Chapter of the Florida Native Plant Society, was held October 2, 1982. With the cooperation of professionals, the purpose was to disseminate information, to provoke the thoughtful use of natural areas and native plants, as well as to encourage new horticultural uses of native plants.

The Marie Selby Botanical Gardens, Sarasota. *Lee Kuhn*, Director of the Eric Young Micropropagation Centre has appointed two new members of his staff. *Susan Rogers* has been named laboratory supervisor. She is a graduate in horticulture education from Purdue University, and studied at Cox Arboretum in Dayton, Ohio. *Lori Wilson* has joined the staff as library technician. She comes by her interest in orchid micropropagation naturally; her grandfather, Pete Morgan and her mother, Judy, are involved as volunteers at the Gardens. *Dr. John T. Atwood, Jr.*, has been named director of the Gardens' Orchid Identification Center, and director of the education program. One of the nation's leading orchidologists, he is acclaimed as a researcher, teacher, lecturer, and as a writer. Assisting *Dr. Atwood* is *Janet Kuhn*, who continues as curator. Educational Activities for December will include two renowned orchidologists, *Dr. Carlyle A. Luer*, and *Rodrigo Escobar*, who will give an illustrated presentation on Pleurothallids. Luer and Escobar are two of the world's authorities on some of its most bizarre orchids. Luer is a member of Selby Gardens Board of Trustees, and Escobar comes to the Gardens from Colombia, South America.

Georgia

Callaway Gardens, Pine Mountain. *Fred Galle*, Curator of Callaway Gardens, was awarded the Liberty Hyde Bailey Award by the American Horticulture Society at the 37th Annual meeting.

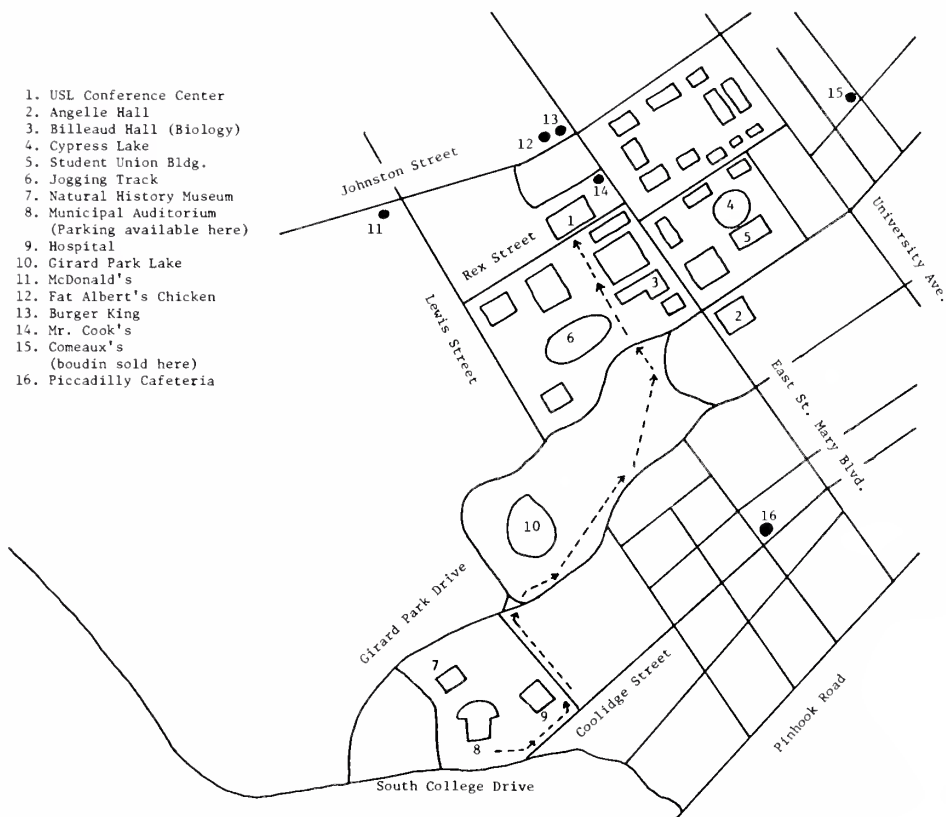
North Carolina

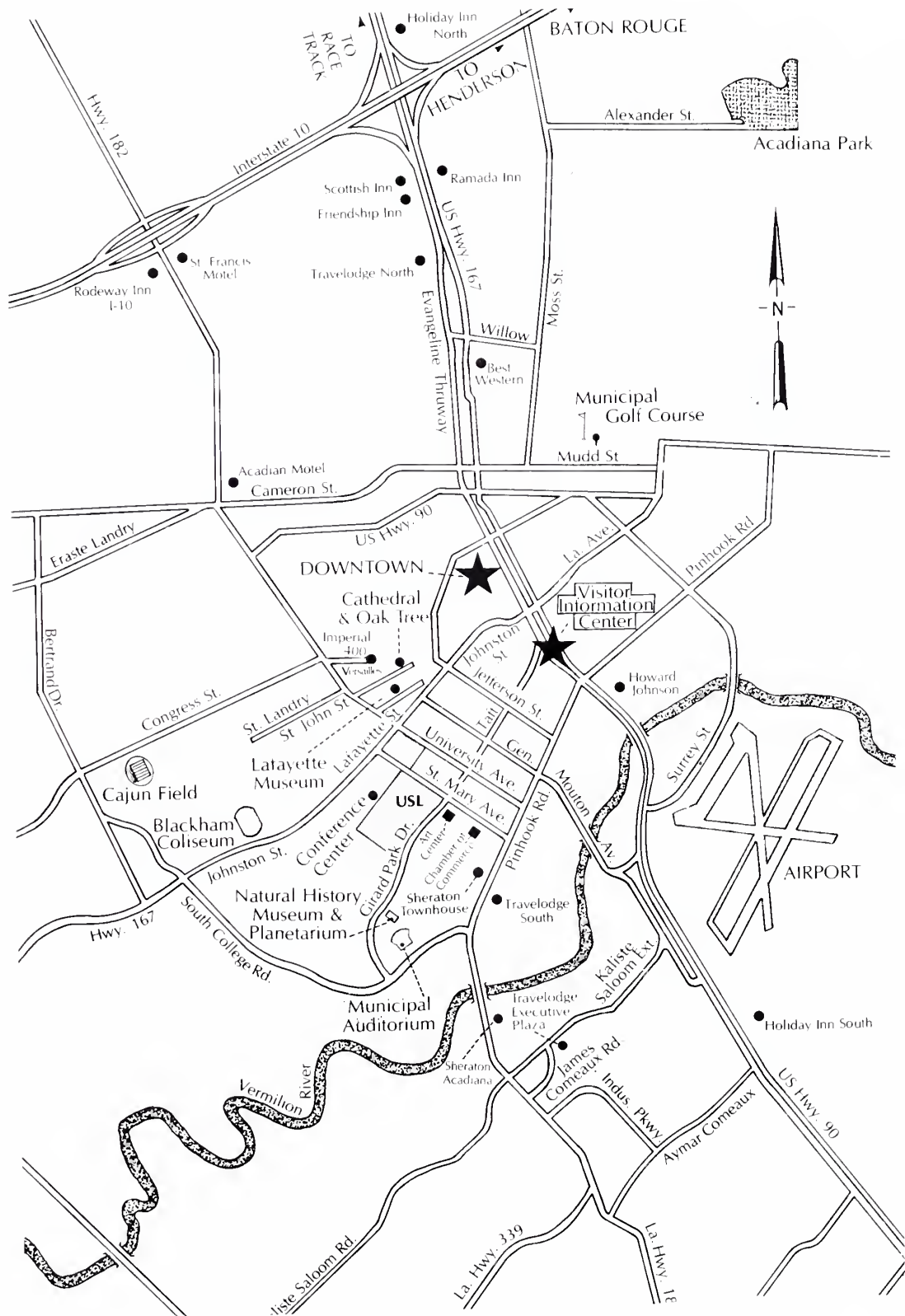
North Carolina State Museum of Natural History, Raleigh. *Peter Domville* resigned as head of the museum's Exhibits Section. He is replaced by *Daniel J. Lyons*.

South Carolina

Brookgreen Gardens, Murrells Inlet. The Interpretive Center was opened to the public and dedicated on 10 April 1982. This multi-faceted facility strengthens the educational program of the Gardens. The Board of Trustees was pleased to welcome over 1000 members and guests to the dedication ceremonies.

1. USL Conference Center
2. Angelle Hall
3. Billeaud Hall (Biology)
4. Cypress Lake
5. Student Union Bldg.
6. Jogging Track
7. Natural History Museum
8. Municipal Auditorium
(Parking available here)
9. Hospital
10. Girard Park Lake
11. McDonald's
12. Fat Albert's Chicken
13. Burger King
14. Mr. Cook's
15. Comeaux's
(boudin sold here)
16. Piccadilly Cafeteria





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The ASB

BULLETIN

Volume 30, Number 3

July 1983



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Convergent Evolution

***The Official Quarterly Publication of
The Association of Southeastern Biologists***

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COVER

Smaller white-lipped deer from Tibet and larger elk from Siberia or America. See the article by Dr. Geist on the Evolution of Ice Age Mammals.

TIME AND PLACE OF FUTURE MEETINGS

1984	April 11-14	Memphis State University
1985	April 10-13	Middle Tennessee State University, Murfreesboro
1987		University of Georgia, Athens (50th Anniversary)

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Walton Distinguished Lecture Series

Mountain Lake Biological Station

The Walton Lectures were established in memory of Miss Peggy Walton, a long-time summer resident at the Mountain Lake Biological Station. Each summer one or two outstanding scientists in some aspect of field biology presents a lecture at the Station and visits with Station residents for a few days. Previous lectures were given by:

(1980) Eugene P. Odum, University of Georgia
Paul A. Colinvaux, Ohio State University

(1981) Lincoln P. Brower, University of Florida
Dian Fossey, Cornell University.

The 1982 lecture was presented by Professor Valerius Geist, University of Calgary. This is No. III in the published series.

On the Evolution of Ice Age Mammals and its Significance to an Understanding of Speciations

by
Valerius Geist

*Faculty of Environmental Design, University of Calgary,
Calgary, Alberta T2N 1N4, Canada*

Abstract

During the Pleistocene many lineages of large mammals evolved exceptionally large ornate species in extreme environments with harsh climates, such as alpine, arctic, periglacial, and deserts. These species are termed grotesque giants. By contrast, tropical giants of the same family tend to be of a primitive body plan although they may be highly specialized ecologically. Ice Age giants are ecologically generalists, they have large brains, their hair coats feature contrasting colour and hair patterns, while in ungulates horn-like organs enlarged and complexified in many lineages. These evolutionary developments are illustrated here by Old World deer. It is also shown that Old World primates show the same pattern of adaptive radiation as do other mammalian lineages, and that *Homo sapiens* is an Ice Age grotesque giant analogous to Irish Elk, moose, cave bear, mammoth, or woolly rhino. To explain the evolution of Ice Age mammals it is necessary to explain aspects of periglacial environments, which dispels the notion that unproductive tundra surrounded glaciers. On the contrary, on the sunny, lee side of glaciers, periglacial ecosystems were maintained at a high level of productivity due to fertile

glacial silt and loess, the regular pulses of melt water and abundant sunshine. The evolution of new "design" and "stasis" thereof, followed by gradual evolution via efficiency selection is discussed in detail. The evolution of new forms is tied to the colonization of rich, unoccupied, and uncontested habitats. Here colonizers grow to distinct *dispersal phenotypes*, characterized by high reproductive rates and luxurious body growth and behaviour which are freed from material competition but intensify social competition. Such selects rapidly for larger bodies, sturdier weapons, better bluffing abilities, and display organs. Colonization is a time of maximum individual reproduction in which any genetic advantage in social competition for mates is rapidly enshrined in the gene pool. It is also a time of maximum non-Darwinian evolution, and the production of phenodeviants as intense selection for social competitive ability disrupts the genomes homeostasis. After colonization, individuals revert to *maintenance phenotypes*. Now follows selection for efficiency in procuring and processing scarce material resources. This "fine-tunes" the new form. New features evolved during dispersal are underdeveloped in maintenance phenotypes and, since the environmental variance for such features is expected to be very large, genetic selection for such features becomes random. This leads to overall morphological stasis. The only evolutionary change is on organs that are affected by efficiency selection. An understanding of large mammal evolution in the Ice Ages indicates that our present conception of human evolution is in need of revision.

INTRODUCTION

The Pleistocene brought on an unprecedented evolutionary turmoil to large mammals. Speciation and extinction rates quadrupled over those in the Tertiary (Gingerich 1978), while the products of Pleistocene evolution were mammals quite unlike anything previously. Typically, they are giants of their respective lineages that occupy extreme ice Age environments such as the periglacial, arctic, and alpine zones; they are ornate by virtue of contrasting colour patterns, hair styles, and often complex horn-like organs; they are ecologically generalists capable of living in highly seasonal environments that, of necessity, demand broad capabilities; they evolved relatively and absolutely large brains as one would expect if brain size correlates with the diversity of capabilities mastered. I have termed these products of Pleistocene speciation the "grotesque giants" and discussed their rise, and the circumstances thereof, in greater detail in a book (Geist 1978). This paper is a review of the main points of that work, but also an upgrading in some parts.

An understanding of how Pleistocene mammals evolved has implications to an understanding of speciation in general, and, therefore, to the current controversy about "punctuated equilibrium" versus "gradualism" (Eldridge and Gould 1972, Gould and Eldridge 1978, Gingerich 1980). It has implications for anthropology in that it contests current thinking about human evolution, and it has implications for a subject as far-fetched as a general theory of health (Geist 1978). To understand the evolution of Pleistocene mammals it is best to look in some detail at one lineage. I shall use the Old-World deer to illustrate the general phenomenon.

A LINEAGE OF ICEAGE MAMMALS—THE OLD-WORLD DEER

We note first that deer, ordered by complexity of antler form, at once fall into an evolutionary pattern (Fig. 1). Deer with less complex antlers precede, in time, deer with more complex antlers; the two-pronged antler-plan is of mid-Tertiary origin, the three-pronged plan appears in late Tertiary times, the four-pronged plan in the Villafranchian or period of minor glaciations, and the five- and six-pronged plans appear during the major glaciations, within the last two million

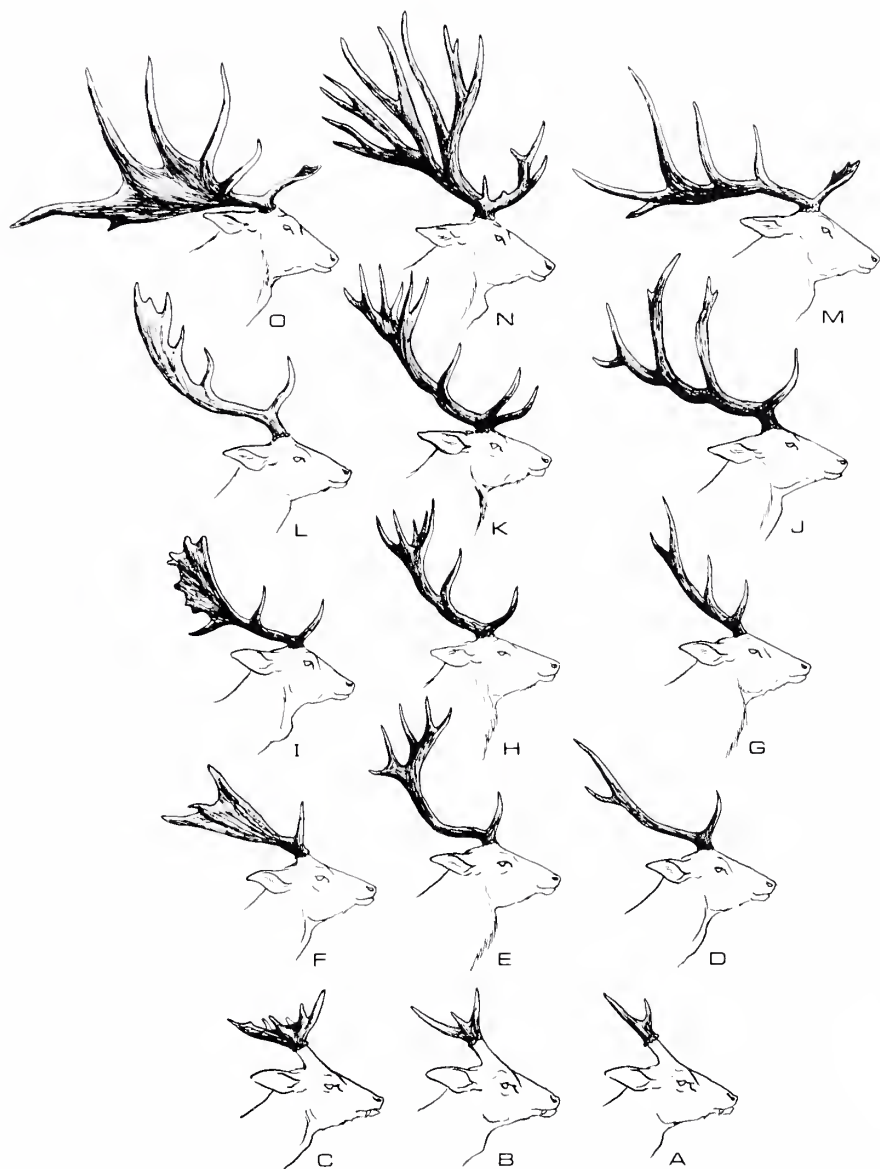


Fig. 1. Old World deer species, living and extinct, arranged in order of antler complexity. Bottom row, two-pronged antler plan; next row, three-pronged plan followed by four-, five- and six-pronged plans. For each antler plan one finds the simple, the supernummary tined, and the palmated versions. By so arranging deer, one obtains also an evolutionary gradient; two-pronged deer of mid-Tertiary age give rise to three-pronged deer of the late Tertiary, which give rise to four-pronged deer in the Villafranchian, which give rise to advanced deer in the Pleistocene. A. *Eustylloceros*, mid Miocene; B. *Dicrocerus*, early Miocene; C. *Stephanocemas*, mid-Miocene; D. *Axis*, late Pliocene; E. *Rucervus*, age unknown; F. *Cervavitus*, late Miocene and early Pliocene; G. *Cervus*, Villafranchian; H. *Cervus elaphus*, mid-Pleistocene; I. *Dama*, late Villafranchian/early Pleistocene; J. *Euctenoceros*, Villafranchian; K. *Cervus elaphus*; L. *Anoglochis ramosus*, Villafranchian; M. *Megaloceros savini*, mid-Pleistocene; N. *Eucladoceros dicranios*, Villafranchian; O. *Megaloceros giganteus*, late Pleistocene. (After Geist 1971b).

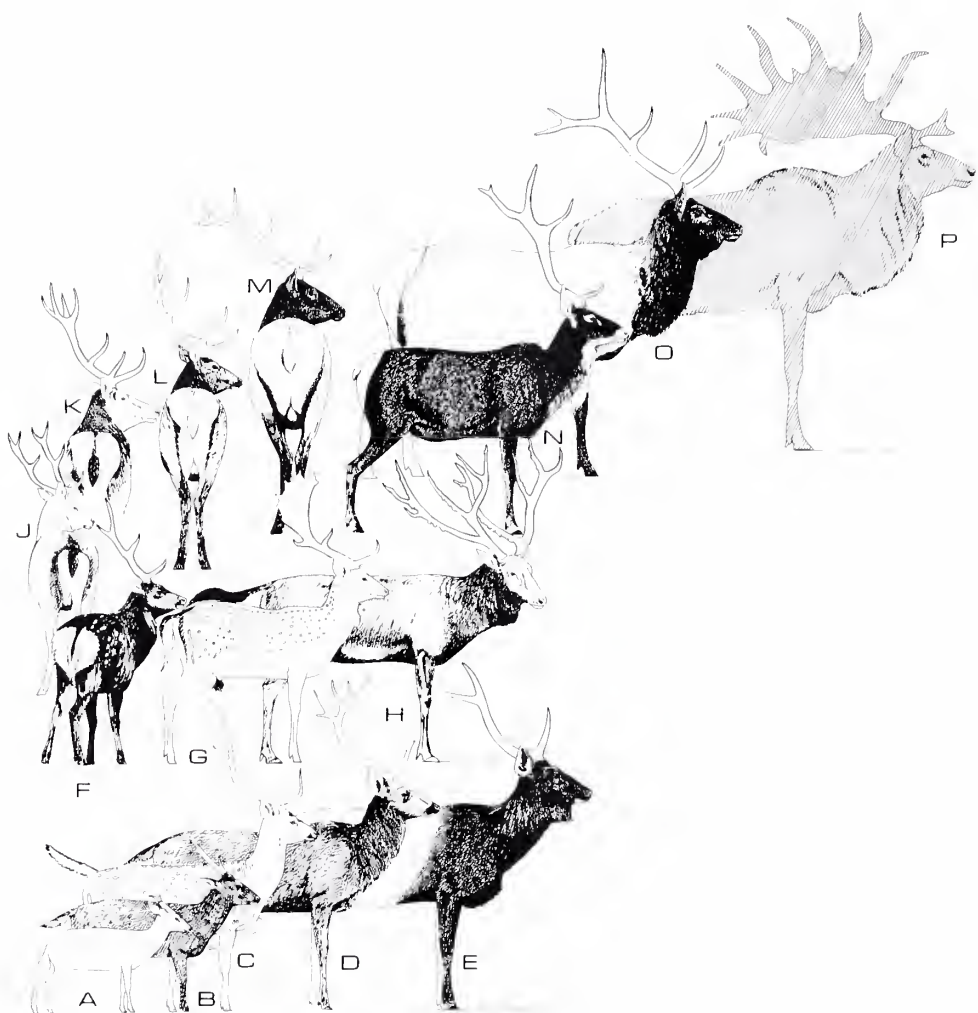


Fig. 2. Major continental evolutionary radiations of Old World deer, comprising the south-east Asian radiations (A–E), the remains of the temperate zone radiation (F–H), the alpine radiation from the line of rusine deer (N), the red deer radiation into the sub-arctic (J–M and O), and the megacerine (giant deer) radiation (G and P) which is all but extinct. The abscissa represents body size, the ordinate length of winter or increased climatic severity; the placement of deer in this field is approximate only for clarity of illustrations. Although large bodied species are found at every level of climatic severity, the body plan changes progressively with each level of climatic severity; three-pronged deer with long tails and conservative coat patterns are found in the tropics; four-pronged deer in the warm, temperate zone; five and six-pronged deer with ornate exteriors in the cold, alpine and periglacial zones. A. Indian muntjac, *Muntiacus muntjac*; B. hog deer, *Axis porcinus*; C. axis or spotted deer, *Axis axis*; D. barasingha, *Rucervus divaunceli*; E. Indian Sambar, *Rusa unicolor*; F. Sika deer, *Cervus nippon*; G. fallow deer, *Dama dama*; H. milu or Pere David's deer, *Elaphurus davidianus*; J. Atlas red deer, *Cervus elaphus barbarus*; K. European red deer, *C. e. hippelaphus*; L. Buchar deer, *C. e. bactrianus*; M. Izubr (wapiti), *C. e. xanthopygus*; N. white-lipped deer, *Przewalskium albirostris*; O. wapiti or elk, *Cervus elaphus canadensis*; P. giant deer or Irish elk (extinct), *Megaloceros giganteus*.

years. Along with each complexification of antlers, is an increase in body size. Also, one notes a peculiar symmetry in that there are three variants of each plan, the simple, the super-nummary-tined, and the palmate version. If we apply geologic dates to these forms it becomes evident that the time to reach the four-

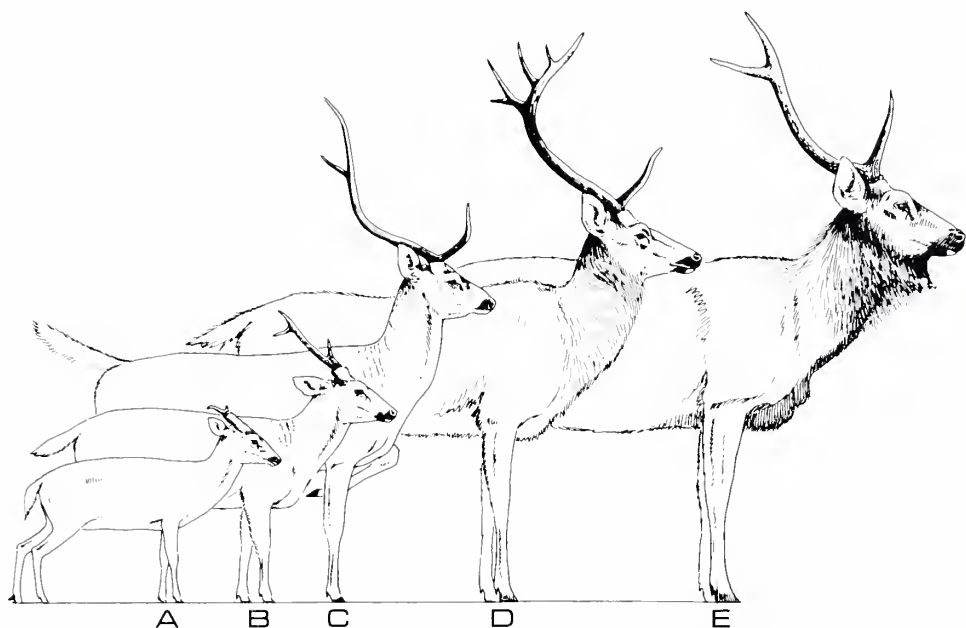


Fig. 3. Tropical Old World deer radiation in India. Names as in Fig. 2. These deer are structured on the most primitive body plans of Old World deer. The muntjac represents the two-pronged antler plan and has long canines typical of ancient, mid-Tertiary deer. All others feature a three-pronged plan with rudimentary canines. All have a long tail, modest hair patterning, and rather uniform colour; the axis deer features a juvenile coat in adulthood. The axis deer, barasingha, and sambar have relatively long, sub-hypsodont molars, an adaptation to grazing on tough-fibered tropical vegetation. The sambar is thus a giant, but of a primitive body plan with the most advanced grazing dentition among living deer.

pronged plan from the two-pronged plan (mid-Tertiary to the Villafranchian, approximately 25 million years) is about six times as long as it took to reach the six-point plan from the four-point plan (Villafranchian to late Pleistocene, approximately four million years). Clearly, evolution accelerated with the glaciations.

Since Old-World deer (*Plesiometecarpalia*) are found in reasonable species diversity one can arrange the living forms two-dimensionally by body size and climatic extreme as in Figure 2. Shown here are two evolutionary radiations: one radiation within a latitude to fill non-overlapping niches and the second radiation across latitudes and altitudes from warm to cold environments. I have ignored, for the time being, the island radiations of deer, which is the third major form of evolutionary radiation. Since Figure 2, as it stands, is too detailed, I shall dissect out each radiation for separate treatment.

Figure 3 shows the tropical radiation on the Asian mainland of Old-World deer. These are deer with primitive two- or three-pronged antlers, long tails, no rump patches, and modest secondary sexual organs. Here we also find a giant, the sambar (*Rusa unicolor*). However, it is a giant built on a primitive body plan (three-pronged stage). It is ecologically highly specialized with long, broad cheek teeth adapted to coarse grass-like vegetation. We face here a peculiar contradiction: an animal with a primitive body plan, that is, a plan which evolved well before the Pleistocene which, at the same time, is highly specialized ecologically. It is primitive and specialized, all in one. The same phenomenon is illustrated even

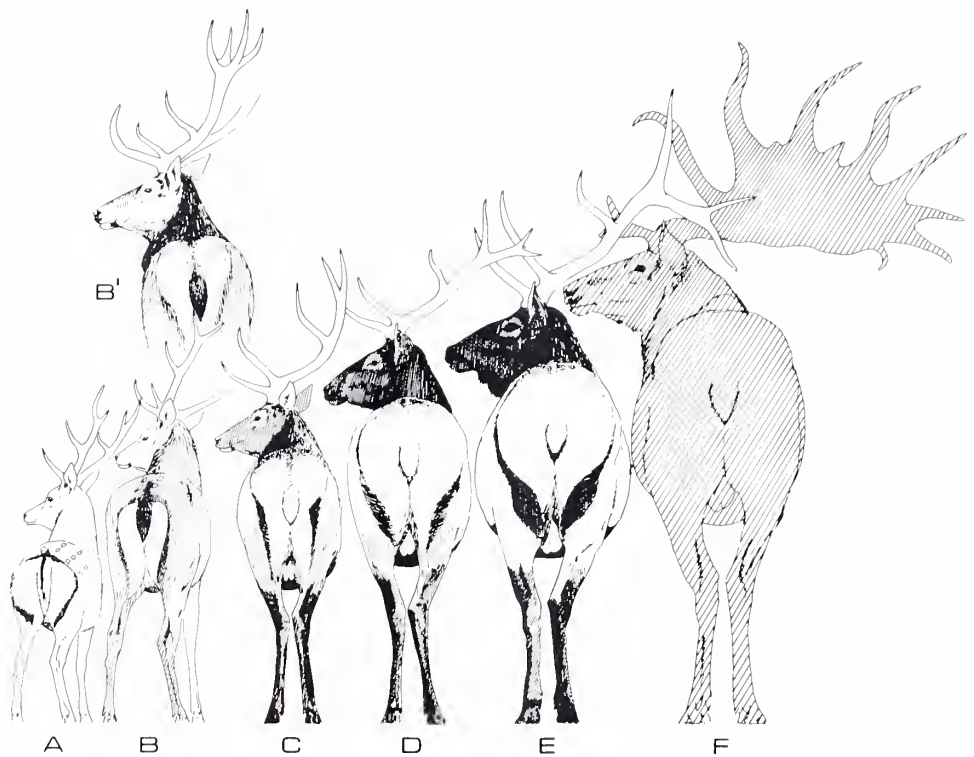


Fig. 4. The red deer radiation. I have added the giant deer to illustrate the maximum size attained by periglacial deer (the extinct moose *Alces latifrons* may have been larger; it was a New World deer). Note the increase in body size, antler size, complexity of rump patch, and decrease in tail length with advancement from temperate to sub-arctic zones. Names as in Fig. 2.

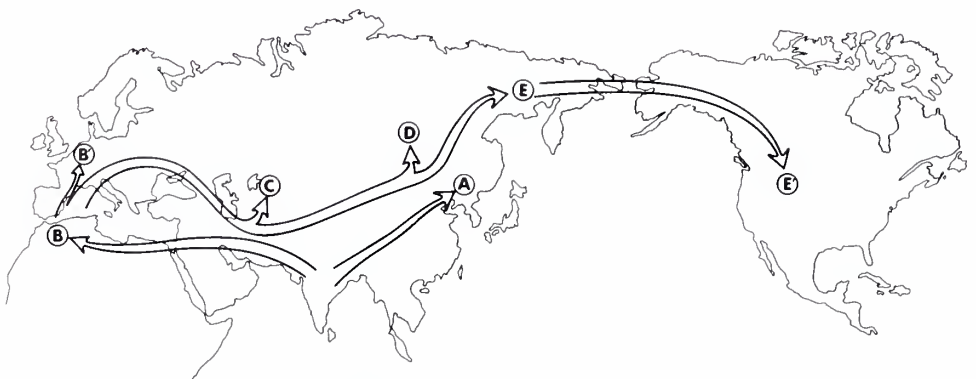


Fig. 5. A hypothetical geographic radiation pattern of the red deer. An ancestral four-pronged deer, adapted to cool climates in the foothills of the Himalayas disperses both east and west. In the east it stagnates into the sika deer (A) which retains its primitive form. In the west a more advanced deer (B) results from the dispersal *en par* with the present day Barbary stag. From here red deer penetrate Europe to give rise to the European type red deer (B'). They continue to move into continental areas to the north of the Eurasian mountain chains giving rise to five-pronged deer similar to the Bukhara stag (C). They continue to advance eastward giving rise to the primitive wapiti, akin to Izubr stags (D). These invade Beringia late in the Pleistocene (E) and disperse from here to America (E'). (After Geist 1971b).

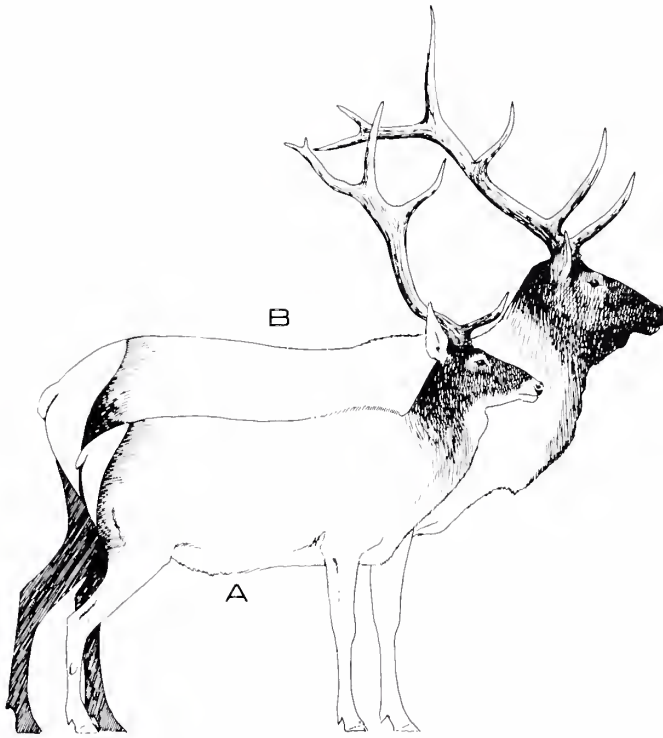


Fig. 6. The end products of altitudinal and latitudinal radiation may evolve surprising convergences. The white-lipped deer (A) from Tibet and the elk (B) from Siberia or America (the races are virtually identical and indistinguishable). Note the similarities in antler structure, rump patch size, and tail length.

more crassly by the common giraffe. Its body plan is that of the earliest of mid-Tertiary giraffes (Churcher 1978, Thenius and Hofer 1960). However, the giraffe is highly specialized *ecologically* to feed on high-growing browse. Giraffes with advanced body plans, the plains-dwelling sivatheres, which advanced into temperate zones are extinct. We encounter this apparent contradiction in other mammalian lineages.

Figure 4 shows the evolutionary radiation of the red deer lineage from temperate to sub-arctic zones; I have added *Megaloceros* as an example of an extreme form from an extreme habitat, the periglacial sedge steppe. We note concurrent increases in size and complexity of antlers, increased body and rump patch size, a shortening of the tail, and an increase in contrast between the dark and light parts of the body. These changes occur concomitantly with an increasingly more continental climate, characterized by increasingly longer and colder winters. Figure 5 shows the geographic locations of the forms illustrated in Figure 4 excepting *Megaloceros*. The geographic dispersal is complex, but the broad picture is quite evident: speciation from primitive to advanced body plans flows basically from geographic areas with benign to those with extreme climates.

Winter length increases not only latitudinally, but also altitudinally. Figure 6 shows the results of latitudinal and altitudinal speciation in Old-World deer, the wapiti (*Cervus elaphus canadensis*) and the white-lipped deer (*Przewalskium albirostris*). The similarities in antler and rump patch/tail development are striking.

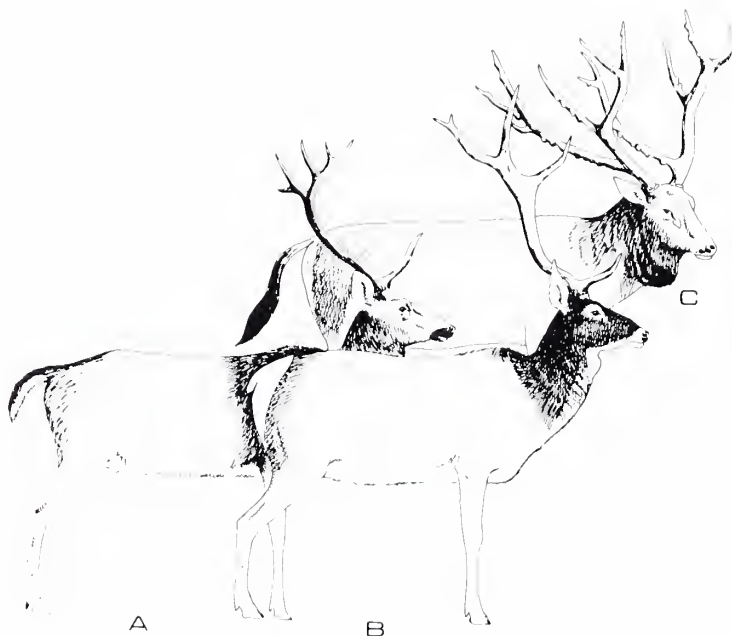


Fig. 7. Deer species of similar size (barasingha, milu, and white-lipped deer), two being swamp dwellers which are typically large and one an alpine form. Note that the radiation from tropical to temperate zone swamp is associated with complexification and enlargement of antlers, as is the step from low to high elevation. As antler size increases so does tail length, while in cold climate forms it is the rump patch that enlarges. The tail in cold climate species may be subject to Allan's rule; it is reduced due to problems of thermoregulation.

This is the more so, since the white-lipped deer, according to Flerov (1952), is a separate radiation from the *Rusa* deer. That is, it has little relationship to the *Cervus* deer. We shall note again later the parallels between latitudinal and altitudinal speciation.

It is worth mentioning briefly that in radiating from forest to savannah, deer also jump in body and antler size; even more so if they adapt to marshes. Figure 7 shows a subtropical marsh deer, the barasingha (*Rucervus*), a warm-temperate zone marsh deer, the milu (*Elaphurus*), and the high-altitude deer from the same lineage, the white-lipped deer. Note the jump in antler and tail size in the milu compared to the barasingha, and the apparent equivalence of tail and rump patch size.

The above patterns of within-latitude radiation to produce a diversity of species with primitive body plans in the tropics and subtropics, and between latitudes/altitudes radiation to produce species with advanced body planes is shown in other lineages. It is shown in the New-World deer (Fig. 8), in the rupicaprid/caprid radiation (Fig. 9), in bovines (Fig. 10), in bears (Fig. 11), and it is also shown in the anthropoids and hominids (Fig. 12). This latter point is in some contradiction to current dogma about human evolution, but one can make a sound case that humans evolved by speciating sequentially into environments ever more demanding—just as did other mammals—and terminated in a grotesque periglacial giant, *Homo sapiens* (see Geist 1978). The gorilla in Figure 12 is quite comparable to other tropical giants of primitive body plan, but specialized ecologically

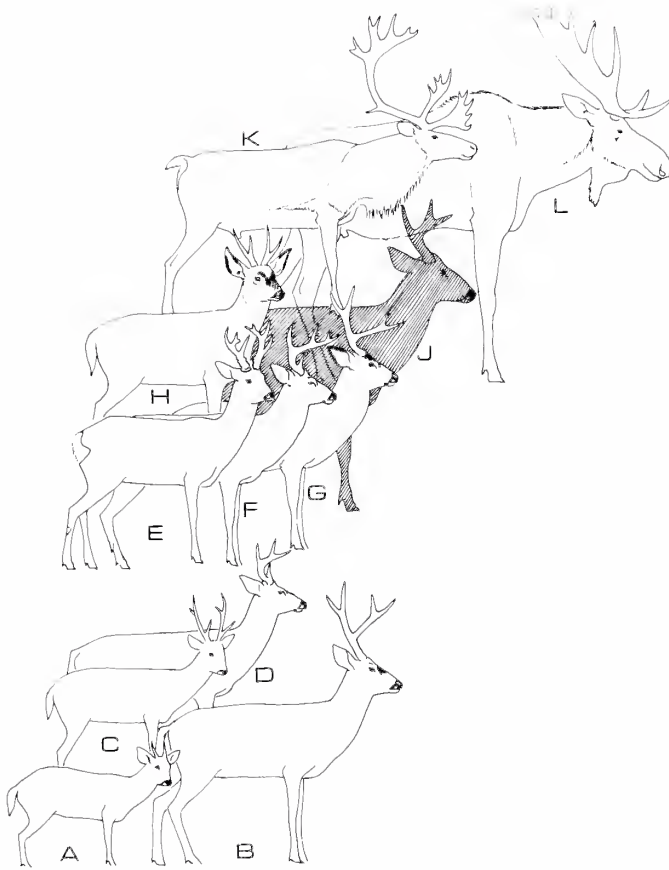


Fig. 8. Radiation of New World deer. The New World deer are a smaller group but they show the same pattern of evolution as do Old World deer. There are dwarfs with short antlers and long tails in the tropics, large-bodied antlered forms in tropical and subtropical wet lands; mountain forms tend to be larger than closely related relatives from the low lands while grotesque giants are found in arctic, subarctic, and periglacial environments. Antler size, complexity, and ornateness run in parallel; tail length is reduced in cold climate forms—or it becomes well insulated as in white-tailed deer. A. brocket deer, *Mazama*, resource defender from tropical forests; B. marsh deer, *Blastocerus dichotomus*, large form from tropical marshes; C. pampas deer, *Blastocerus campestris*, deer from subtropical savannah; D. white tailed deer, *Odocoileus virginianus*, subtropical savannah; E. siberian roe deer, *Capreolus pygargus*, subarctic; F. white tailed deer, cold temperate; G. mule deer, *Odocoileus hemionus*, montane hot deserts to subarctic; H. huemul, *Hippocamelus antisensis*, temperate montane; J. *Navahoceros*, montane, late Pleistocene, extinct; K. caribou, *Rangifer*, subarctic, alpine, arctic; L. moose, *Alces*, cold temperate to subarctic.

such as the gaur (*Bibos gaurus*), the sloth bear (*Melursus ursinus*), the serow (*Capricornis sumatrensis*), the marsh deer (*Blastoceros*), and the sambar (*Rusa unicorn*). Gorilla, chimpanzee, orang-utan, and gibbon all feature the primitive body plan, namely that of a resource-defender armed with highly damaging weapons; this body plan is the point of departure for the hominid body plan which shows evidence of selection against damaging weapons, just as found in gregarious plains-dwelling bovids, horses, or deer. Humans are comparable to other end-products of Pleistocene evolution such as the Irish elk (*Megaloceros giganteus*), moose (*Alces alces*), caribou (*Rangifer*), musk oxen (*Ovibos*), polar bears (*Ursus*



Fig. 9. The rupicaprid or goat-antelope radiation. The rupicaprids are paleontologically older and ancestral to the Pleistocene caprids (sheep and goats). A diminutive tropical ancestor has not been discovered as yet, but is predicted by the above pattern. The tropical giant among living forms is the main-land serow. Forms from extreme environments, either cold or hot, are large bodied and ornate. The Barbary sheep (D) is from hot Sahara mountains. Extremes in horn size, body size, and coat patterning occur in arctic, alpine and periglacial zones (*Ovibos*, *Budorcas*, *Ovis*, and *Oreamnos*). This is a large radiation, difficult to accommodate in the vector field of size and climatic severity. In these forms tail size is long in warm climates, short in cold climates. Tail size and rump patch size have an inverse relationship. A. Goral, *Nemorhaedus goral*; B. Scrow, *Capricornis sumatrensis*; C. wild goat, *Capra aegagrus*; D. Audad or barbary sheep, *Ammotragus lervia*; E. Chamoise, *Rupicapra rupicapra*; F. Markhor, *Capra falconeri*; G. Tahr, *Hemitragus jemlahicus*; H. Takin, *Budorcas takin*; J. mountain goat, *Oreamnos americanus*; K. Siberian argali, *Ovis ammon ammon*; L. musk oxen, *Ovibos moschatus*.

maritimus), mammoth (*Mammuthus primigenius*), or woolly rhino (*Coelodonta*). That we are a giant among primates, and an exceedingly grotesque and brainy one, is probably beyond dispute.

The above pattern of evolutionary radiation is shown best by the large herbivores and fairly recognizably by omnivores. Carnivores show it least. It appears



Fig. 10. Part of the bovine radiation, excluding tropical water buffalos and relatives. A. *Anoa depressicornis*, a primitive tropical form from Celebes adapted to wet forests; B. the banteng, *Bibos javanicus*, a tropical savannah bovine; C. gaur, *Bibos gaurus*, the specialized tropical giant among bovines. (As in other radiations, species from wet land such as the water buffalo, are huge, large horned, and gregarious. The step from forest to savannah or steppe is associated with large body size, shown by African buffalo; i.e., *Syncerus caeffer nanus* to *S. c. caeffer*. The move of African buffalo from central to north Africa left a huge-horned giant, *Homioceros*, now extinct. None of these forms are illustrated here.) D. *Bos primigenius*, the temperate zone and E. its high country form, the Yak, *Bos mutus*; F. *Bison bonasus*, the primitive European forest bison; G. the extinct Steppe wisent, *Bison priscus*, from periglacial zones in Europe, ancestral to the Siberian and American bison radiation; H. *Bison latifrons*, the late Pleistocene giant American bison, first bison in southern North America.

that the smaller the geographic area occupied by a species, the more likely will its family or tribe show the above types of evolutionary radiation.

Constraints on a Theory of Pleistocene Mammal Evolution

How is one to explain the evolution of species just described? There are a number of common elements between the different lineages: in the radiation into increasingly colder climates, we note increases in size and ornateness. Where as the former trend could be—simple minded!—related to greater cold and longer

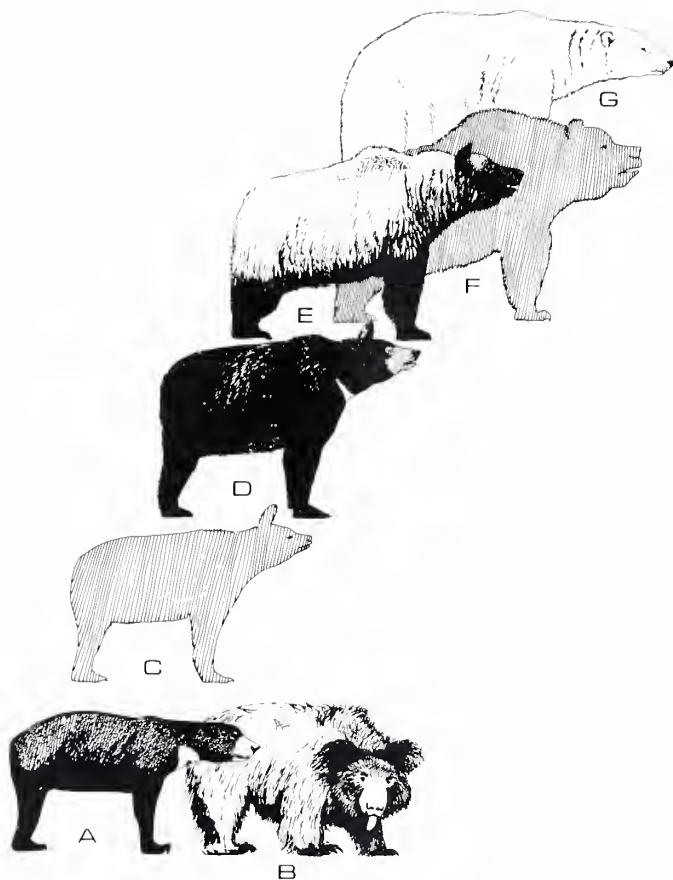


Fig. 11. The radiation of Old World bears. A. the tropical sunbear *Helarctos*; B. the tropical, ecological specialist among bears, the insectivorous and frugiverous sloth bear, *Melursus ursinus*; C. the Villafanchian temperate zone bear, extinct *Ursus minimus*; D. the temperate zone forest bears, here illustrated by the American black bear, *Ursus americanus*; E. the alpine and subarctic bear of cold climates, the brown or grizzly bear, *Ursus arctos*; F. the periglacial cave bear, *U. spelaeus*, extinct; G. the bear from extreme environments, the arctic marine bear, the polar bear, *Thalarctos maritimus*.

duration of winter, one could hardly relate ornateness and increasing antler complexification to greater cold. Also, body size and ornateness appears to increase with aridity and temperature extremes in rather hot climates, a trend illustrated by gazelles and antelopes, which I did not treat here (see Geist 1974). Even if antler complexity was somehow related to thermoregulation, as suggested by Stonehouse (1968), it is still necessary to explain why, in other lineages, the tusks increase, or horns increase, or differences in the length of body hair increase, or colour-contrast increases. Such are not related to thermoregulation, surely. Note for instance the concurrent increases in antler and hair patterns as exemplified by moose (Fig. 13), or as discussed earlier for red deer (Fig. 4), or marsh-dwelling deer (Fig. 7), or New World deer (Fig. 8), or the opposite relationship in the Old-World sheep (see Geist 1971a, Fig. 43). Note also that in *Bison* the display hairs of bulls are grown and shed, analogous to antlers in deer. That is, the display hair is fully developed just before the mating season, and shed thereafter (Lott 1979).

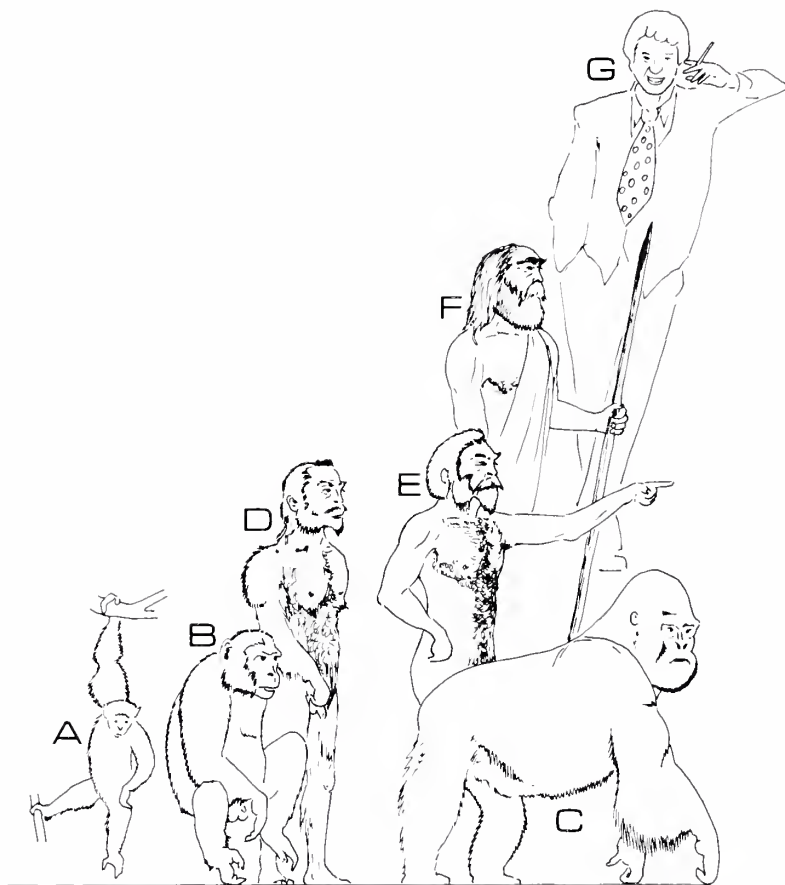


Fig. 12. The anthropoid radiation. Here we recognize the same pattern as in other mammalian Pleistocene radiations. Tropical forms with a primitive body plan (resource defense) including ecologically specialized tropical giants, and a radiation by one lineage (hominids) into temperate and extreme environments. A. gibbon, *Hylobates concolor*, monogamous resource defender; B. chimp, *Pan troglodytes*, kin-selected resource defender of a group territory; C. gorilla, *Gorilla gorilla*, primitive giant; D. extinct *Australopithecus*, social savannah form; E. extinct *Homo habilis*, steppe form—probably the first human with a human social system; F. *Homo erectus*, successful temperate zone human with relatively stable technology which existed through most of the Ice Ages, extinct; G. modern man, *Homo sapiens*, arises as cold, periglacial form in late Pleistocene and disperses to all extreme environments on earth, a process which terminates only in historic times.

Therefore horn-like organs must not be considered in isolation from other social organs.

We also note the following: in deer, antlers are a tissue highly sensitive to nutrition (Beninde 1937, French *et al.* 1955, Bubenik 1966). They are a tissue of low growth priority, as termed by animal scientists. So are the bone-tissues of the face, as shown by Shackleton (1973) for bighorn sheep. We see that face and antler size increase in advanced relative to earlier or primitive forms. That is, tissues of low growth priority are progressively *canalized* in their expression. The more advanced in phylogeny, the more are tissues of low-growth priority actualized in ontogeny. See also Beninde's (1937) pioneering work on red deer on this very point.

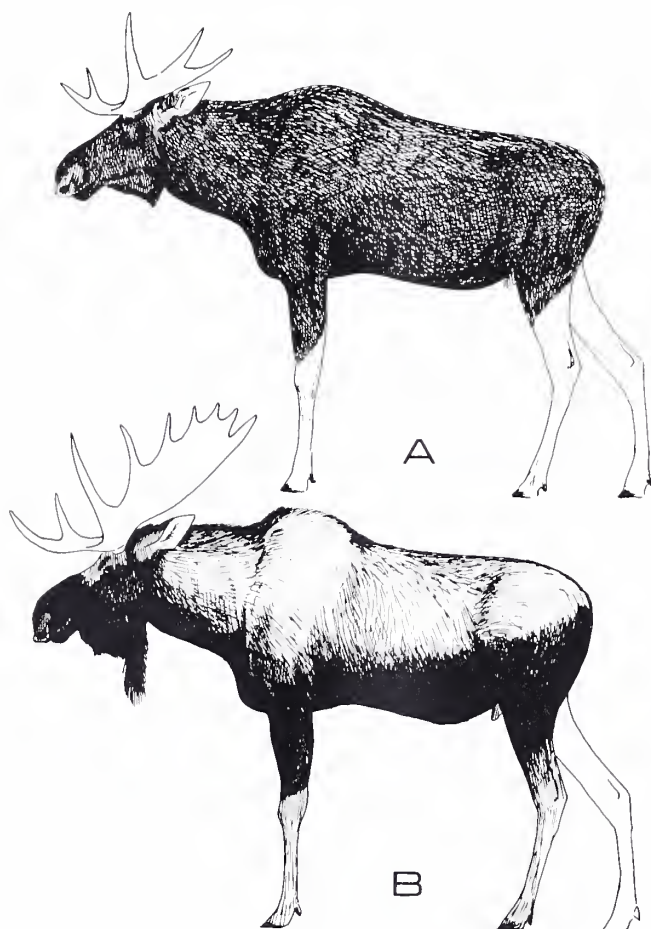


Fig. 13. European moose above, American moose below. Antler size and complexity tends to change concurrently with other display organs, such as hair patterns and coat colour. By comparison with the primitive (three-pronged) European moose, the American moose has larger, more complex antlers based on a four-pronged plan, he has a longer and deeper bell, and a light saddle. His legs are darker than those of the European moose and his face is sexually dimorphic: American moose females have a light brown face and rostrum, bulls have a light brown face but a black rostrum. European moose are monomorphic.

By comparing primitive tropical giants with advanced cold-climate giants we note that large body size and social adaptations (such as enlarged rump patches, neck manes, antler complexity, and colour contrast) are not related. In short, if species reflect latitudinal/altitudinal gradients of changes in *social organs*, then one's explanation of speciation must account for selection for social organs. However, a theory of Pleistocene mammal speciation must account for more.

It must also account for a close link between zoogeography and species differences. Sympatrically existing species tend to be of similar evolutionary grade. This is illustrated for instance, by tropical mainland deer (Fig. 3) or by the island radiation of Old-World deer which are all two-pronged and three-pronged deer (Grubb and Groves in press). It is also shown by a comparison of moose and red

deer in Europe, Manchuria, and North America. In Europe we find a basically four-pronged red deer and primitive three-pronged moose; in Manchuria we find a primitive four-pronged moose and a primitive six-pronged wapiti; in America we find an advanced palmate moose and large-antlered six-pronged wapiti. In short, speciation and zoogeography appear closely linked. A theory of speciation must show how.

We also note that species with primitive and advanced body plans exist simultaneously. Clearly, three-pronged deer in the tropics have remained three-pronged deer since the inception of this plan. They exhibit evolutionary stasis. In comparing them to Tertiary deer we find few changes. In the mutjacs we note a reduction of rudimentary phalanges in modern compared to mid-Tertiary forms (Flerov 1952), little change indeed. Also, red deer from their first appearance in mid-Pleistocene times have retained, in some populations such as the red deer in the Himalayas, their primitive antler form, a point already stressed by Ernst Schaefer (see Engelmann 1938, p. 31), and re-emphasized by Grubb and Groves (in press). In short, a theory of speciation must also explain stasis.

Yet, we must NOT explain the changes in social organs in the latitudinal/altitudinal radiations as *adaptations* to ever more demanding (climatically) habitats. I pointed out earlier (Geist 1971a, 1971b) that evolutionary clines did not only follow climatic gradients. Rather, they were *dispersal* gradients that went, at times, counter to the warm-cold gradients discussed earlier. Since most speciation has run from the warm south to the cold north, it only *appears* as if the "grotesqueness" of Pleistocene mammals follow a warm-cold gradient. If such were the case, we would not expect that Siberian species radiating into North America would *increase* in body size. Such mammals radiated from colder to warmer climates. This has made North America a land of Pleistocene mammal giants. For, if one compares members of the same species east and west of the Bering Straits, those in America are inevitably larger than those in Siberia.

From the foregoing the following restraints on a theory of speciation are evident: it must explain increases in body size irrespective of habitat or characteristics, it must show that social—not ecological—selection generates the novel forms, it must explain stasis, it must link speciation with zoogeography, and it must show how tissues of low growth priority are canalized. I shall show below, how these conditions are met. However, I must first turn to answer a question which is common but false, namely: how is it possible for periglacial giants to exist when the regions about glaciers are so desolate and unproductive a landscape? The answer is, that it is not! It is a misconception that periglacial ecosystems are unproductive.

Periglacial Ecosystems

I have dealt with periglacial ecology in greater detail elsewhere (Geist 1978, pp. 185–210), and only a brief overlook will be presented here. Periglacial ecosystems are basically pulse-stabilized, that is, perpetually immature ecosystems. They are generated by a pulse of rock-flour and water expelled annually by the glacier. The glacier itself acts as a gigantic rock-mill which grinds rock into fine particles. These particles are spewed out with water forming silt in the braided streams draining glaciers. Massive amounts of silt are expelled, rapidly filling valleys. The silt, upon the seasonal recession of water, is exposed to sunlight and wind. It dessicates and

is blown away from the glacier and deposited as loess. The latter is exceedingly fertile.

On the lee-side of the glacier, that is, downwind from the weather systems which deposit their snow masses on the firm fields at the glacier's epicentre, we expect open skies to be the rule. The lee side of the glacier is therefore expected to be sunny. Also, air masses moving across the glacier are expected to develop katabatic winds, that is, "chinooks" or "foehn" winds on the lee side. Winds normally blow away from glaciers. Therefore, the loess is transported well beyond the glacial fringes forming a loess-steppe, the size of which depends on the size of the glacier (Fig. 14).

We now have, at the lee side of the glacier, four conditions vital for plant productivity: a highly fertile substrate, a large amount of sunlight, relatively high surface temperatures due to high solar radiation and katabatic winds, and water flooding seasonally wide areas. One must not forget that the southern edges of continental glaciers extended to relatively low latitudes in Europe and America, and that in Europe such edges came relatively close to the Gulfstream that must have washed the coastlines of present-day Spain, Portugal, and France. Glaciers can be viewed analogous to waves in the intertidal zone whose disturbances generate a very rich fertile ecosystem. Moreover, the moraine fields themselves are attractants to ungulates because mineral licks form in the many depressions wherever a mixture of water and silt is subject to slow evaporation.

The popular conception, that tundra surrounded continental glaciers, is false. Tundra is confined to shaded areas within a narrow belt at the edge of the glacier as well as to nunataks, that is, elevated areas which rise above the ice and are surrounded by it. Tundra can exist only away from the fertilizing effects of loess-bearing winds.

In general we expect a sharply-patterned mosaic of habitats at the lee side of the glacier, but dominated by loess-steppe and sedge meadows in the seasonally flooded areas. Forests, composed mainly of conifers, will be in the wind shadow of hills and ridges, that is, away from the glacier. In general we expect very warm microclimates in the deep canyons cut through the loess fields, and a concomitant warm-climate flora. In short, our conventional wisdom about life in the sight of glaciers is much in need of revision. In the meantime, for those able to do so, I urge a visit to the Ice fields of the St. Elias Range in the western Yukon and Alaska, where one may find forest and shrub lands, and even moose wintering on as well as beside glaciers.

The periglacial ecosystems are significant in that it produces a high pulse of productivity and probably contained per unit area some five or more times the biomass of mammals tundra could support (see Geist 1978, p. 195). It is the very antithesis to the impoverished, leached surfaces of old landscapes. We also expect extreme fluctuations in temperatures and a very long cold season. These conditions favour large body size.

It was Margalef (1963) who pointed out that body size of individuals is proportional not to the productivity but to the productivity *pulse* of an ecosystem. We expect, under conditions of high, constant productivity, a high biomass made up of small-bodied individuals; where a high pulse of productivity exists—that is a great difference between maximum and minimum annual productivity—we expect a low biomass and few but very large and well developed individuals. Large body size is adaptive in that large bodied individuals are able to save

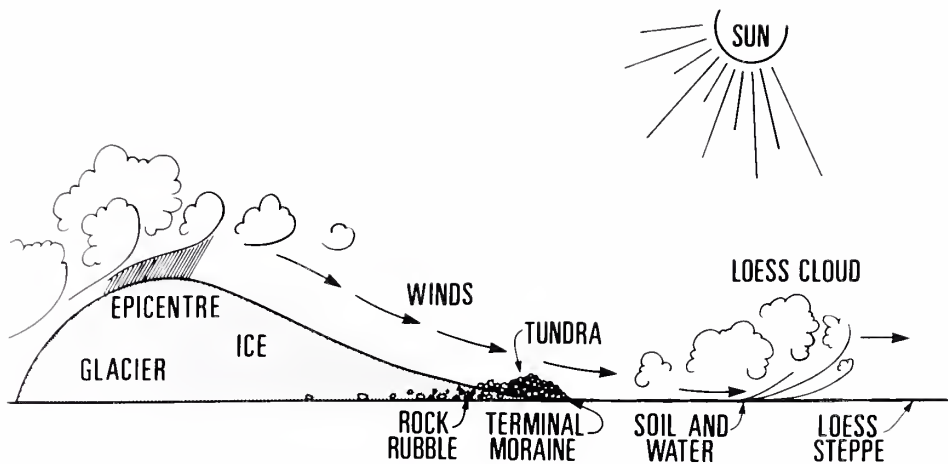


Fig. 14. Elements of the periglacial ecosystem. A glacier is formed when weather systems deposit snow in a specific locality to form firn fields. These compress, become ice, and move outward. On the side from which weather systems approach, the glacier is built up; on the lee side it melts off during outward movement of the ice. Such outward movement pushes rock rubble, forming a moraine. It also grinds up rock and with melt water spews it beyond the moraine. If the water level shrinks, the rock dust or silt is exposed to the sun and dries out. Winds sweeping from the glacier carry this rock dust away, depositing it as loess. A loess-steppe stretches beyond the glacier. Tundra is found on the terminal moraine and on elevated land surrounded by a glacial ice. Since the lee side of the glacier tends to have clear skies, there is a high incident of sunlight at the ablation edge. Water, sunlight, and fertile loess ensure a high productivity, particularly if the glaciers edge is at low latitudes or close to a warm ocean current.

relatively more energy and nutrients from the abundance of the vegetative season in the scarcity of winter. Because large bodied individuals have, per unit of body size, a lower metabolic demand than small bodied individuals (Brody 1945), large individuals can live longer on the same percentage of body stores (fat, vitamins, minerals) than small individuals. Once some factor selects for large body size, this large size can be perpetuated in an ecosystem with a high productivity pulse. The more one moves from low to high latitudes or altitudes the higher and narrower the productivity pulse, and the more likely large body size to arise.

Evolution of Novelty

To explain the evolution of new forms in Ice Age Mammals we must first turn to phenotypic plasticity or norm of reaction of genes. We discovered in our studies of bighorn sheep two extreme phenotypes, quite different in morphology and behaviour (Geist 1971, 1978a, pp. 116–144; Shackleton 1973, Horejsi 1976). I have called them *maintenance* and *dispersal phenotypes* (see Geist 1978, pp. 116–144) (Fig. 15). The former arises under conditions of resource shortage, the latter when resources for growth and development are abundant. One can make a good case for the hypothesis that the genome of the developing zygote within a pregnant female somehow communicates through its mother with the external environment and shapes itself to anticipate major factors in that environment. The major message appears to be the protein content of the forage consumed by the female. A high protein content in the forage consumed indicates that the female was free

PHENOTYPES

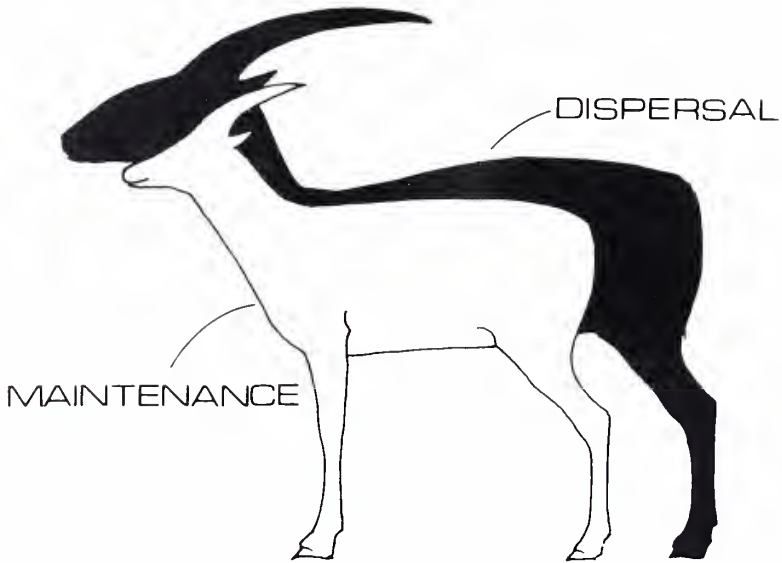


Fig. 15. The same genotype can give rise to two extremes in phenotypic development, depending on the amount of resources available for growth and development. Note the differences in proportions between dispersal and maintenance phenotypes. These develop due to better development of tissues of low growth priority in dispersal phenotypes.

to choose the most nutritious forage, which in turn means that there is little or no competition for forage; such a condition can exist naturally only when a habitat is either colonized or re-colonized and the opportunities for reproduction are excellent. A high protein content leads to the birth of young not only large in body size but with behavioural characteristics antithetical to those of young born under a regime of low protein abundance. That is, the young born to a female on a high protein diet acts as if it had a high threshold to both pain and signals of success, or "pleasure." It cannot be discouraged by pain, nor satisfied for long by a successful completion of an act. In ethological jargon, it performs much appetitive behaviour. In plain English, it is always on the go! It explores, runs, plays, and is much on the move. Its appetite appears insatiable. It suckles frequently and long. The mother on good forage is able to pay for this activity by the young with a high production of milk. The young thus grows up rapidly, it reaches maximum body size permitted by its genome, its tissues of low growth priority are well developed, it is capable of a very high reproductive rate, it is very active socially, but it has a short life expectancy as an adult. In short, it is programmed to capitalize on vacant habitat and to compete socially.

The maintenance phenotype is the obverse of the dispersal phenotype. It is small bodied, under-developed, relatively lethargic but overtly aggressive, it has a low reproductive output, the females are relatively poor mothers, there is little play but the adults have a long life expectancy. In essence, the maintenance phenotype is an efficiency phenotype while the dispersal phenotype is one of luxurious development. The maintenance phenotype is thus one which can reduce maintenance costs to a minimum in order to save as much as possible for repro-

duction and we expect it to be an able competitor for *material* resources. It is programmed to achieve reproduction when a habitat is filled to capacity and competition for forage resource is extreme. Dispersal phenotypes—but not maintenance phenotypes—should be very sensitive to shortages of material resources, and move away readily from areas with depleted resources. The dispersal phenotype is morphologically what animal scientists call a “high-plane animal”, that is, one raised on a high plane of nutrition, while a “low plane animal” is a maintenance phenotype. While the dispersal phenotype is an r-strategist in reproduction and the maintenance phenotype a K-strategist, it would be inappropriate to call these phenotype r- and K-phenotypes respectively. An r- or K-strategy in reproduction is a vital part, but only a part of the respective overall adaptive strategies of these phenotypes.

The above is a sketch of the logic of dispersal and maintenance phenotypes. For a detailed treatment of this phenomenon I must refer to chapter six of my book (Geist 1978). Subsequent to its publication I came across other relevant publications. My prediction that it is the protein in the female’s diet which generates dispersal phenotype characteristics (Geist 1978, pp. 139–144) was verified experimentally in humans by Chauvez and Martinez (1979). Our expectation that human beings, like good mammals, should not only show a positive correlation between resource availability and body size (a fact long known, see Tanner 1962) but should also increase overall activity and social interactions with resource availability, has been verified and anticipated by the work of Young and Willmott (1973). Humans thus appear to form good maintenance and dispersal phenotypes. We can now turn to the process of speciation.

The following accounts for the evolution of Pleistocene Mammals:

(1) A new form evolves only if it disperses into a *large area of vacant, uncontested* habitat. No vacant, uncontested habitat—no speciation!

(2) Individuals entering such habitat give rise to dispersal phenotypes (within a few generations, because maternal effect prevents full-fledged dispersal phenotype development within one generation. Such is indicated by the data of Denenberg and Rosenberg 1967, and Chandra 1975).

(3) Competition now shifts from competition for material resources to competition for mates.

(4) The colonizers at the same time have exceedingly high reproductive rates.

(5) Given abundant forage, *all* individuals grow to, or close to, their genetic maximum. This means that the *differences* in body size are genetic differences; a small individual is likely to be small because of its genes. The genetic variance is thus close to unity, and the environmental variance close to zero. Therefore, the genetic substrate is fully exposed to natural selection for body size, and rapid, directed, changes in gene frequency can take place.

(6) Granted males of dispersal phenotypes, that is 2–3 times heavier than maintenance phenotypes, or “normal” males, and granted that dispersal phenotype males interact socially at least two times as frequently as maintenance phenotype males, then we can expect much harder combat among the colonizing males than is the case in maintenance populations. A vital factor in winning fights is body size (Clutton-Brock *et al.* 1979). Under the foregoing conditions we therefore expect rapid selection for body size.

(7) Since the reproductive rate is high, and individual life expectancy is short, only a high reproductive output per annum—not the spread of reproductive effort

over many years—is adaptive. This is so because each year a new generation of competitors is added, competitors selected for body size, which exclude any small bodied individual with a strategy of extended (K-strategy) reproduction (Geist 1971a).

(8) Since the force of blows increase in direct proportion with body size, combat among dispersal phenotype males selects for very sturdy combat organs, both of offense and defense. We have thus concomitant genetic selection for big, robust bodies and weapons.

(9) In ungulates, combat is very damaging, as I have pointed out repeatedly (see Geist 1971, pp. 228–238; 1978, pp. 62–85), and as has been emphasized by Clutton-Brock (1982). We expect damage among dispersal type males to be even higher. Some relevant information is provided by Ulenhaut and Stubbe (1980). They studied combat damage among rams in an introduced mouflon (*Ovis ammon musimon*) population which was also subsidized materially in winter. They confined themselves strictly to osteological damage on the skull. From 180 skulls 135 showed severe damage, including healed fractures. Nothing like that is found in maintenance populations of bighorn sheep; for mouflon, there is no data for maintenance phenotypes (as such are not expected to exist in European managed populations). Granted the high damage in combat, and granted the short life expectancy of males, it becomes highly adaptive for males to somehow gain the fruits of combat without paying the high price so as to maximize time for reproduction. This calls for sophisticated *bluffing*.

Bluffing, that is convincing opponents to accept defeat without combat, can only be effective where the chances of meeting an opponent repeatedly within a mating season is very low. The shorter the season of intense competition, the lower the population density, the more opponents roam in search of females during the season of intense social competition, the greater the adaptive value of bluffing. This predicts that what ethologists call display organs and dominance displays will be selected for under dispersal conditions. That is, not only will organs which are formed of tissues of low-growth priority be selected for, but also such attributes of the animal which focus attention on it and emphasize the mass of its body and horn-like organs. (For a discussion of attention guiding adaptations see Geist 1978, pp. 90–98). Therefore, concomitant with selection for body size and sturdy combat organs, will be a selection for more showy dominance displays and all attributes that make such effective. The colonizers grow larger, more ornate in external appearance, and more specialized in combat techniques.

(10) Not only is Darwinian evolution via sexual selection maximal in the colonizing population as described above, so is non-Darwinian evolution via founder effect and genetic drift in the small, colonizing populations.

(11) We also expect, due to severe unidirectional selection for size and combat efficiency, an increase in the proportion of phenodeviants. At this time the genome itself comes under selection in that a new homeostasis is evolved. Till then the frequency of aberrant individuals is expected to be high.

(12) So far we dealt briefly with social and non-Darwinian evolution, however, there is also the potential for ecological selection to influence the arising gene pool and genome architecture. Here we need a brief departure to some basic attributes of dispersal phenotypes: as indicated earlier, they are characterized by a high level of activity and play. This is the necessary prerequisite for behavioural exploration of novel attributes of the new habitat being colonized. It is therefore the prereq-

quisite of adjusting first behaviourally and phenotypically to new opportunities (or to new dangers). Such initial adjustment leading to genetic adaptation is only possible as long as individuals are dispersal phenotypes. This cannot be over-emphasized. Novel adjustments generally will NOT be made by maintenance phenotypes because such, saving every calorie from maintenance towards reproduction, will not invest energy, time, and effort to explore new situations. Such costs of exploration would be charged in the maintenance phenotype against its savings for reproduction. Maintenance phenotypes living under resource shortages could not be explorers or innovators since such would detract from their fitness. However, dispersal phenotypes living with abundant resources can assume the cost of innovation and adjustment to opportunities without paying an undue price in fitness. Moreover, those who have successfully adjusted to dangers or opportunities, granted high reproductive output, are greatly rewarded in that even slight advantages by individuals translate quickly into high fitness. Therefore, the process of novel ecological adaptation can proceed only where the cost of trial and error and adjustment is minimal for the individual, but the gains in fitness are high. This is the case during colonization.

(13) The process of behavioural (phenotypic) to genetic change is envisioned, briefly, as follows: *all* individuals in a population are affected by a stressor (or take advantage of a new opportunity); if *all* are affected and adjust—which they do behaviourally, which in turn leads to physiological phenotypic adjustment in all, which in turn leads to visible morphological changes—then the *differences* in success between individuals are due to genetic, not environmental differences. Since in a colonizing population with a high reproductive rate even small differences in success in adaptation between individuals will lead to great differences in fitness, and this fitness is related to *genetic* differences, there is the potential for rapid genetic selection for new adaptations. (If the *environmental* variance for a trait is high among individuals, evolution towards that trait is minimal.) Therefore, only during colonization and abundant material resources is it likely that new ecological adaptations will be evolved. However, since the same is valid for social adaptations, as well as for random genetic change, we conclude that the evolution of novelty is restricted to the short time of a species colonizing extensive, vacant habitat.

(14) Once a species has filled all habitat available for colonization, all selection for large body size, ornateness, etc., plus any new ecological adaptation comes virtually to a halt—and an entirely new type of evolution begins, the evolution of efficiency in the new adaptive syndrome. This comes about by a reversal of the preceding scenario: individuals fill the habitat and begin to compete for material resources; resources for growth and development become scarce. Therefore individuals grow up as maintenance phenotypes. Therefore, body size shrinks as does the size of luxury organs. Since maintenance phenotypes maximize fitness by being more able to find, process, and conserve material resources they are *efficiency* phenotypes; the more material resources can be spared from growth and maintenance toward reproduction, the higher an individual's fitness. This is a vital point. Shrinkage in body and horn size after initial radiation is shown well in American mountain sheep. These radiated out to their present distribution in what was the refugium south of the Laurentide Ice Sheet about 15,000 BP. (The dates of 68–33,000 BP given by Stock and Stokes 1969 are not valid. The Lake Bonneville deposits containing sheep remains date from the very late Wisconsin.

W. L. Stokes and D. Currie, Dept. Geography, Univ. of Utah, personal communication, August 27 & 30, 1982). The earliest forms are very large and have been, understandably but still erroneously, considered a separate species (*Ovis catclawensis*). By 10,000 BP bighorn sheep assumed their present size (Harris and Mundel 1974). American bison showed the same size reduction after colonizing the southern refugium post glacially (Wilson 1978, 1980).

(15) Once individuals are but one half or less the size they could potentially grow to under better material conditions, selection for large body size—so typical of the dispersal and colonizing stage—must come to a halt. This is so since, at phenotypically small body size, the differences in body size between individuals are almost always environmental; even if a large bodied individual dominates, and breeds very successfully, this does not insure selection for large body size; its size may be due to fortuitous environmental circumstances. When environmental variance for a trait increases, genetic selection for that trait becomes increasingly random. The less the phenotype reflects directly to the genetic potential, the more random selection is for that potential; the more random genetic selection for a given trait, the more static that trait. Since in the maintenance populations individuals fail to reach full potential in body size and tissue of low growth priority, selection for such features comes to a virtual halt; stasis of form sets in. This is valid only in so far as this new form is not altered by *efficiency* selection.

We can thus see two types of principally different Darwinian selection regimes: the rapid evolution of a "New Design" during colonization, and its "fine tuning" via efficiency selection from then on till its extinction. Thus a new form arises rapidly—too rapidly to be adequately grasped via the fossil record. With its rise there appears great variation in form due to restructuring of the genomes architecture. This variation vanishes as a new, balanced genome arises. Then efficiency selection on the maintenance phenotype sets in producing smaller bodies and display organs, as well as attributes that increase the efficiency of food processing. For instance we expect a gradual enlargement and molarization of teeth, as this is one change that allows grinding of food and greater efficiency of digestion.

From this we can see that in the current dispute over "punctuated equilibrium" versus "gradualism" both parties are quite correct. New Designs indeed must appear very rapidly; New Designs are subject to gradual change during "fine tuning". This does not exclude fluctuations in size and proportions with climatic and edaphic factors (see Kurten 1968). Palaeontologists studying teeth, which are very much subject to "efficiency" selection, since they do not appear to be very plastic phenotypically, of course see major but gradual changes. This is well illustrated in small mammals from the early Tertiary in America (Gingerich 1980), about whose external appearance and changes in display organs we know nothing. If one had nothing but teeth to study for the cervids, one could not have said too much about their evolution, since there is little relationship between changes in body plan and teeth.

We also note that the evolution of "New Designs" must be very rare. It is likely confined to the colonization of large areas of uncontested habitat. Such can arise only when climatic changes are massive and large areas within continents may consequently lose and gain new faunas and floras. Europe, north of the Alps, is one such "mouse trap." In warm interglacials it can hold warm climate faunas, but such become isolated and die out when cold climates appear north of the European mountain chains that run east and west. However, these same areas

should become islands of warm climate floras with the return of warm climates, well before they can be invaded by warm climate faunas. Here would be large areas of rich, uncontested habitat appearing with each interglacial and ready for recolonization. East-west mountain ranges as well as oceans would create in Europe major obstacles to a north-south shift of faunas with major climatic changes and thus ensure both extinctions as well as speciation. Speciation is thus the complementary response to extinctions, but tied to major climatic changes and the appearance of large areas of uncontested habitat. Granted the rapid climatic changes generated by alternating glacial and interglacial periods, both extinction and speciation rates should be high in the Pleistocene as is indeed shown by Gingerich (1978).

We also note that the preceding theory predicts the following: the oldest form in a given geographic locality should be very large-bodied; body size and the size of horn-like organs should decline with time after colonization and speciation. Body size and antler size is expected to increase step-wise with major glaciations. We thus would get a steep increase in size with each dispersal and a slow decline thereafter, followed by another increase; size fluctuations due to climatic and edaphic factors may be superimposed on these trends. Speciation *in situ* is not expected. The ancestor of a form which appears in the fossil record for the first time will not be found in that locality. For instance, *Alces* appears in Europe at the beginning of major glaciations (Heinz 1981); its ancestor is not likely to be found in Europe but very far to the east.

The theory of evolution of ice age mammals presented has a number of implications to an understanding of human evolution (see Geist 1978a). In general, the evolutionary radiation of hominids and apes follows that of other lineages of large, herbivorous mammals (Fig. 12). This implies that human evolution, like that of Pleistocene mammals in general, was timed by glacial events and concomitant climatic changes, and that each new human form is an adaptation to an environment of greater climatic demand. One can identify the following steps:

- (1) A kin-selected, tropical forest-adapted, Pliocene ancestor similar to *Pan*.
- (2) A late Pliocene, tropical savannah-adapted descendant, *Australopithecus*; this form appears to increase tooth size progressively (see Gingerich 1979, p. 71).
- (3) A Villafranchian form adapted to life in warm, open steppe (but also able to live in a less extreme habitat), *Homo habilis*, which co-exists with an increasingly specialized *Australopithecus*.
- (4) A species able to live in temperate zones, arises with the first of the major glaciations (about 1.9 million years ago), *Homo erectus*. It changes little over the course of the Pleistocene, and its culture changes only very gradually and very little.
- (5) A cold-adapted species which arises with the massive, extensive, Riss glaciations late in the Pleistocene and which occupies periglacial zones and ultimately all extreme habitats, *Homo sapiens*. It colonizes the periglacial environments twice late in its existence, once as Neanderthal man, and once as modern man in the Upper Paleolithic.

An *in situ* model of human evolution is not likely valid. That is, man did not evolve slowly into its present form in Africa. Anthropologists must get used to the view that there were long pauses or stasis with little if any change in human

evolution; the pause for *Homo erectus* may have been in excess of 1.5 million years, which would make it a very successful, able species indeed. Also, compared to *Homo erectus*, our own species, *H. sapiens*, appears to be the canalized dispersal phenotype of the parent species. More puzzling still is, in the upper Paleolithic, the long period of exceptional dispersal phenotype development of the *Cro Magnids*. Such development—unattained by modern populations—can only be maintained artificially. This raises horrendous and most embarrassing implications (see Geist 1978). I mention this because the preceding discourse on how large mammals evolved in the Pleistocene is pregnant with implications that are pertinent to an understanding of our own species, a grotesque Ice Age giant *par excellence*.

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At the Lafayette Meeting

1983 MERITORIUS TEACHING AWARD

This year's recipient of the Association's Meritorius Teaching Award was Dr. Frederick T. Wolf, Professor Emeritus of Vanderbilt University. The award was presented by Dr. Beryl Franklin, chairman of the committee. This award was comprised of a certificate and a check for \$1000.00, sponsored by Carolina Biological Supply Company. Professor Wolf will also receive a bound volume of the letters of support from former students and colleagues.

Dr. Wolf began his teaching career at Vanderbilt University after completing his A.B. at Harvard, the M.A. and Ph.D. at Wisconsin, and a research fellowship at Harvard. Moving through the academic ranks, he was promoted to Professor of Botany in 1956. He is co-author of a two-volume classic textbook, *The Fungi*, and has contributed more than 125 scientific publications. Letters attesting to this man's "generosity of time" and "his commitment to excellence" were received from his many former students and his colleagues.



Dr. Frederick T. Wolf

RESEARCH AWARDS

The **1983 ASB Research Award** was presented to *Dr. Michael R. Willig*, Loyola University of New Orleans and his co-authors, *Dr. Thomas Lacher* of Western Washington State University and *Dr. Michael A. Mares* of the University of Oklahoma. Their award-winning paper was “**An Empirical Evaluation of the Assumption of Linearity in Species-Area Relations**” the abstract of which is given below. One of the judges stated that it was a praiseworthy, clear, and incisive re-inspection of the MacArthur-Wilson model of island biogeography and the presumptive log-log linear relationship between species richness and island area.

The equilibrium model of island biogeography as proposed by MacArthur and Wilson assumes a linear relationship between the log of species richness and the log of island area. This assumption has never been empirically evaluated. Nonetheless, biological meaning has been ascribed to both the slope and intercept of straight lines determined by least squares analyses for a variety of data sets. Utilizing replicate data on breeding birds on islands in a lake, we show through analysis of covariance and analysis of variance that, although there is a significant linear component in the regression of species number on island area, the data in fact significantly deviate from a linear model. The straight-line relationship of the MacArthur-Wilson model is a product of a complex series of biological assumptions concerned with the processes of immigration, emigration, competition and extinction. Our results, however, do not support such a linear model and therefore call into question one or more of the equilibrium model's biological components.

The **1983 Student Research Award**, sponsored by **Martin Instrument Company** of Greenville, South Carolina, was presented to two papers that tied for first place according to the judges.

Nat B. Frazer, of the University of Georgia, received the award for his paper on “**Survivorship of Adult Female Loggerhead Sea Turtles, *Caretta caretta*, in the Wild.**” The abstract follows.

This paper presents a survivorship curve for adult female loggerhead sea turtles nesting on Little Cumberland Island, GA, USA, from 1964–1981. A method is described by which information on interseasonal nesting intervals may be used to adjust survivorship records for the high incidence of tag loss common to all marine turtle studies. Adjusted and unadjusted data were plotted as survivorship curves and fit by linear regression ($r^2 = .93$ and $.95$, respectively). A small-sample, one-sided t test for parallelism was used to determine that the slope of the regression for the adjusted data was significantly gentler than that for the unadjusted data ($T = 4.03$; $d.f. = 21$; $p < .001$). Adjusted data reveal that annual survivorship of adult females in the wild is apparently constant at 80.91% per year, indicating a maximum reproductive life span of 32 years. Maximum longevity is thus very likely < 50 years, assuming a 10–15 year age at maturity.

Lawrence P. Rozas, of the University of North Carolina at Wilmington, received the award for his paper “**Utilization of Oligohaline Intertidal Rivulets by Fishes and Macrofaunal Crustaceans in the Cape Fear River Estuary, North Carolina.**” Professor *Courtney T. Hackney* was his co-author. Their abstract follows.

Fishes and invertebrate macrofauna were collected from three intertidal rivulets located in an oligohaline marsh in southeastern North Carolina from July 1981 through June 1982. The composition, relative abundance and seasonal distribution of these animals were determined. A total of 31,147 organisms with a mass (wet weight) of 14.379 kg was collected during 26 sampling periods. Twenty-nine species of fishes representing 19 families and four species of invertebrates were collected.

The most abundant species were spot (Leiostomus xanthurus), grass shrimp (Palaemonetes pugio), bay anchovy (Anchoa mitchilli) and Atlantic menhaden (Brevoortia tyrannus). The major piscivorous predators collected from a tidal creek were freshwater species (longnose gar, Lepisosteus osseus and largemouth bass, Micropterus salmoides). The number of species was greatest during the warmer months. There were three seasonal peaks of abundance attributed to the recruitment of juveniles of spot, Atlantic menhaden, Atlantic croaker (Micropogonias undulatus), and southern flounder (Paralichthys lethostigma) in the spring; bay anchovy and grass shrimp in the fall; and grass shrimp in the summer. The occurrence of these species was unrelated to salinity in the study area, but dependent on time of year. The results suggest that oligohaline areas contain important nursery habitat for some estuarine species.

1983 COMMERCIAL EXHIBITORS

Advanced Scientific, Inc.
Carolina Biological Supply Company (**Patron**)
Delta Biologicals, Ltd.
W. W. Norton & Company, Inc.
Optometric, Inc.
Parco Scientific Company (**Patron**)
John Wiley & Sons, Inc. (**Patron**)
Worth Publishers, Inc.

EMERITUS MEMBERS

A member of the ASB for ten or more years and who has retired from professional duties is eligible for election to Emeritus Membership. Those wishing such designation should make this request to the Treasurer. The following were elected at the 44th Annual Meeting:

J. Frances Allen, Hyattsville, Maryland
Wade Batson, Columbia, South Carolina
Dorothy L. Fuller, Deland, Florida
Don W. Hayne, Raleigh, North Carolina
Edwin A. Hebb, Marianna, Florida
James H. Starling, Lexington, Virginia
Gray W. Waldorf, Pensacola, Florida
Frederick T. Wolf, Nashville, Tennessee

NECROLOGY

During the past year, the Association has lost the following members by death:

Irving E. Gray, Department of Zoology, Duke University, Durham, NC
John A. Yarbrough, Biology Department, Meredith College, Raleigh, NC

RESOLUTION

The following resolution, presented by the Conservation Committee, was passed unanimously by those members attending the annual business meeting on April 15, 1983.

WHEREAS the members of the Association of Southeastern Biologists recognize the interrelated nature of the global problems of population growth, resource depletion, and environmental degradation and;

WHEREAS the members agree that an interdisciplinary approach is necessary to the development of viable solutions to these global crises and;

WHEREAS the North Carolina Academy of Science has taken a leadership role in addressing undergraduate education concerning population, resources, and the environment;

BE IT THEREFORE RESOLVED THAT:

- (1) The Association supports the efforts of the North Carolina Academy of Science in calling for more teaching about the global problems of population, resources, and the environment, in stressing the interrelated nature of these problems, and in challenging the prevailing view that science and technology alone can solve these problems and;
- (2) The Association supports the North Carolina Academy of Science's efforts to develop effective, statewide, interdisciplinary education concerning these problems.

BE IT FURTHER RESOLVED that the Association offers its assistance in furthering the efforts of the North Carolina Academy of Science concerning the teaching of population growth, resource depletion, and environmental degradation, and in promoting similar efforts throughout the southeast.

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. J. Charles O'Kelley, Biology Dept., Univ. of Alabama, University, AL 35486.

Name in full _____ Date _____

Title _____ Department _____

Institution _____

City _____ State _____ Zip _____

Degrees (institutions and dates) _____

Recommended by member _____

Annual Dues: _____ Graduate student \$5.00 _____ Regular \$10.00
 _____ Contributing \$12.00 _____ Sustaining \$25.00
 _____ Family \$12.00 _____ Library subscription \$12.00

ASB TREASURER'S REPORT 1 Jan. 1982 -- 31 Dec. 1982

I. SAVINGS ACCOUNT

A. Merrill-Lynch Ready Assets Trust

Balance Jan. 1, 1982	\$5,555.91	
From Checking to Savings (Net)	5,063.16	
Interest 1982	656.82	
Balance in Savings Dec. 31, 1982		\$11,275.89

II. CHECKING ACCOUNT

Balance on Hand, Jan. 1, 1982	770.66
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A. Receipts

Regular Dues/Subscriptions	13,179.00	
Patron/Institutional Members	2,200.00	
Annual Meeting, Richmond, Ky	2,638.16	
Honorarium Reimbursement	250.00	
(Botanical Society, SE Sect.)		
Bulletin Page Charges	1,901.95	
Sale of Bulletin Issues	3.00	
TOTAL RECEIPTS		\$20,172.00
TOTAL RECEIPTS & BEGINNING BALANCE		\$20,942.66

B. Disbursements

1. Membership Cultivation

Printing & Mailing, Call-for-Dues	567.47	
Printing & Mailing, Call-for-Papers	626.71	
		1,194.18

2. Publication

ASB Bulletin (Vol. 29)	10,094.30	
Roll (Membership) for Bull.	64.09	
Circulation Manager	250.00	
		10,408.39

3. Office Expenses

Treasurer	143.76	
Editor	33.29	
Other Officers	184.99	
Bank Charges	66.41	
		428.45

4. Travel and Related Expenses

Student Travel Awards	1,451.40	
Executive Committee Travel	739.18	
April Speaker Honorarium	500.00	
		2,690.58
5. Research Awards		1,000.00

TOTAL	\$15,721.60
TRANSFERRED TO SAVINGS	5,063.16
TOTAL DISBURSEMENTS	20,784.76
(BALANCE IN CHECKING Dec. 31, 1982)	157.90
**** TOTAL ASSETS	\$11,433.79

Submitted by J. C. O'Kelley, Treas.

Approved by Auditing Committee

Association Affairs

A VIEW FROM HERE

I came away from the University of Southwestern Louisiana meetings feeling very good about the Association of Southeastern Biologists. These were very nice meetings indeed. In contrast to national meetings which tend to be too big, we are privileged to enjoy the benefits that derive from appropriate size. I am reminded again of the important role of our organization—the opportunity to visit with old friends and to make new ones, the chance to listen to interesting papers and exchange views about matters scientific and some things not so scientific, the excuse to visit an area we might otherwise miss, et cetera. Just think of the tragedy of never being exposed to cajun culture, food, and music. Thank goodness I have been saved from such a fate. I feel deeply appreciative to the individuals who worked so hard to arrange for such a successful meeting.

Special appreciation should be expressed for the outstanding lecture at the Lafayette meetings by Dr. Richard Starr on cell differentiation in *Xenopus*. His talk summarized much of his own research and that of his students and illustrated once again the rewards that come from research conducted on especially favorable biological material. There was much of great interest for all. Also notable at these meetings were the special symposia on wetland ecology and on the origin and distribution of Caribbean-Gulf of Mexico crustacean fauna. All individuals responsible deserve our sincere thanks.

From an historical perspective, the meetings at Lafayette may eventually be shown to have very special significance. At the business meeting, an important resolution was presented to the membership from the Conservation Committee. This called for support from ASB in the effort by the North Carolina Academy of Science to promote interdisciplinary teaching about the global problems of population growth, resource depletion, and environmental degradation. Since I have been involved in this effort by the North Carolina Academy of Science, it was especially gratifying to me that this strong statement of support was passed unanimously. A copy of the Academy's policy statement entitled "A Call from the North Carolina Academy of Science for a Greater Commitment by North Carolina Colleges and Universities to Undergraduate Interdisciplinary Teaching About the Related Problems of Population Growth, Resource Depletion, and Environmental Degradation" can be obtained by writing me. (Also see *ASB Bull.* 30:11-12.)

It is strangely ironic that matters of such crucial importance can be so widely appreciated by the scientific community and yet so poorly understood by the general public. Some of us believe that these issues are central to the very survival of our society. I believe as scientists we have a very serious responsibility to help bridge this gap in understanding. I call upon each of you to think of ways this can be done. I am convinced that our collective effort can make a significant difference. One helpful step would be to have other state academies pass similar

resolutions. I hereby pledge a \$100 contribution to the first state academy in our southeast region to do so.

The ASB currently plays an important role in promoting biology in the south-east. We are one of the strongest regional biological organizations in the country. Soon we will celebrate our 50th birthday. We are certainly justified in feeling a sense of genuine accomplishment. But we do need to do better. A larger proportion of our fellow staff members should belong to ASB. More of our students, both undergraduate and graduate, should be encouraged to participate in the Association. Perhaps also we need to have a better balance in our membership and in our paper sessions between the various biological areas.

Plans for next year's meetings at Memphis State University (April 11-14, 1984) are well under way. All indications promise a truly outstanding meeting, both scientifically and socially. Mark these dates on your calendar and make plans accordingly.

There are many things that ASB should be doing. I solicit your ideas, suggestions, and your help. Let's make ASB even better.

—Charles E. Jenner, President

ASB OFFICERS, COMMITTEES, AND REPRESENTATIVES 1983-1984

President—Charles E. Jenner, Biology, University of North Carolina, Chapel Hill, NC 27514 (919/962-1350 or 962-2077).

President-Elect—J. Charles O'Kelley, Biology, University of Alabama, University, AL 35846 (205/348-5960).

Vice-President—Mary C. Dunn, Biology, Middle Tennessee State University, Murfreesboro, TN 37132 (615/898-2829).

Retiring President—Margaret L. Gilbert, Biology, Florida Southern College, Lakeland, FL 33802 (813/683-5521 ext. 323).

Secretary—Rebecca R. Sharitz (1985), Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29801 (803/450-6211).

Treasurer—Robert L. Beckmann (1986), Botany, North Carolina State University, Raleigh, NC 27650 (919/737-3341).

Auditing Committee for 1984—Chairman: Grover C. Miller, Zoology, North Carolina State University, Raleigh, NC 27650 (919/737-2588); Janice C. Coffey, Science, St Marys College, Raleigh, NC 27611 (919/828-2521); Jon M. Stucky, Botany, North Carolina State University, Raleigh, NC 27650 (919/737-2227).

Conservation Committee—Chairman: Diane Tetrake-Merner (1984), Biology, University of South Florida, Tampa, FL 33620 (813/974-2011); Robert D. Sutter (1985), Plant Conservation Program, N.C. Dept. of Agriculture, P.O. Box 27647, Raleigh, NC 27611 (919/733-3610); JoAnn White (1986), Biology, University of North Carolina, Chapel Hill, NC 27514 (919/962-2144).

Local Arrangements Committee for 1984—Chairman: James F. Payne, Biology, Memphis State University, Memphis, TN 38152 (901/454-2955).

Program Chairman for 1984—James S. Jacob, Biology, Memphis State University, Memphis, TN 38152 (901/454-2970).

Meritorious Teaching Award Committee—Chairman: Sandra T. Bowden (1984), Biology, Agnes Scott College, Decatur, GA 33030 (404/373-2571); Steve C. Dial (1985), Biology, Pfeiffer College, Misenheimer, NC 28109 (704/463-7343 ext. 275); Robert B. Short (1986), Biology, Florida State University, Tallahassee, FL 32306 (904/644-3700).

Nominating Committee for 1984—Chairman: J. Frank McCormick, Ecology, University of Tennessee, Knoxville, TN 37916 (615/974-3065); Raymond O. Flagg, Carolina Biological Supply Co., Burlington, NC 27215 (919/584-0381); J. Kenneth Shull, Jr., Biology, Loyola University, New Orleans, LA 70118 (504/865-2769).

Past-President's Council for 1984—Margaret L. Gilbert, Biology, Florida Southern College, Lakeland, FL 33802 (813/683-5521 ext. 323).

Place of Meeting Committee—Chairman: Cletus Sellers (1984), Biology, James Madison University, Harrisonburg, VA 22801 (703/433-6652); A. Floyd Scott (1985), Biology, Austin Peay State University, Clarksville, TN 37040 (615/648-7781); Michael J. Baranski (1986), Biology, Catawba College, Salisbury, NC 28144 (704/637-4442).

Priorities in Public Affairs—Lafayette Frederick, Botany, Howard University, Washington, D.C. 20059 (202/636-6929).

Research Awards Committee—Faculty—Chairman: James D. Caponetti (1984), Botany, University of Tennessee, Knoxville, TN 37916 (615/974-2256); Philip A. Robertson (1985), Biology, Southern Illinois University, Carbondale, IL 62901 (618/536-2331); Michael R. Willig (1986), Biology, Loyola University, New Orleans, LA 70118 (504/865-2193).

Research Awards Committee—Student—Chairman: David Husband (1984), Biology, University of South Carolina, Columbia, SC 29208 (803/777-4255); Donald C. Tarter (1985), Biology, Marshall University, Huntington, WV 25701 (304/696-3148); Richard L. Buckner (1986), Natural Science and Math., Livingston University, Livingston, AL 35470 (205/652-9661).

Resolutions Committee—Chairman: Margaret L. Gilbert, Biology, Florida Southern College, Lakeland, FL 33802 (813/683-5521 ext. 323); George G. Murphy, Biology, Middle Tennessee State University, Murfreesboro, TN 37130 (615/898-2847); James S. Jacob, Biology, Memphis State University, Memphis, TN 38152 (901/454-2970).

Student Travel Award Committee—Chairman: Hazel Delcourt (1984), Botany, University of Tennessee, Knoxville, TN 37916 (615/974-2256); Ronald V. Dimock, Jr. (1985), Biology, Wake Forest University, Winston-Salem, NC 27109 (919/761-5000); Janice C. Coffey (1986), Science, St Marys College, Raleigh, NC 27611 (919/828-2521).

Editor, ASB Bulletin—James W. Hardin (1986), Botany, North Carolina State University, Raleigh, NC 27650 (919/737-2226 or 2727).

Editor, News and Notes—Jon R. Fortman (1984), Biology, Mississippi University for Women, Columbus, MS 39701 (601/329-4750).

Archivist—Madeline P. Burbank, Box 15134, Atlanta, GA 30333 (404/373-1413).

AAAS Representative (Section G)—Lafayette Frederick, Botany, Howard University, Washington, D.C. 20059 (202/636-6929).

New Books

Hadeen, Robert A. 1982. **Naturalist on the Nanticoke: The Natural History of a River on Maryland's Eastern Shore.** Tidewater Publishers, Centreville, MD 21617. \$12.95. 170 pp. illus., hardcover.

In this small book, the author shares with us the enthusiasm he feels for the Nanticoke River, a tributary of Chesapeake Bay, and his fascination with several of its denizens. Eleven chapters, arranged somewhat phylogenetically, treat one or more interesting animals present in the Nanticoke system. Sea nettles, comb jellies, horseshoe crabs, biting flies, garfish, blueback herring, catfish, oyster toadfish, stingray, striped bass, diamondback terrapin, snapping turtle, copperhead, northern water snake, osprey, and certain migratory water fowl are each given special consideration and many other species are mentioned in passing or for comparison. The book is illustrated by three maps and 16 line drawings. These illustrations are good to excellent in quality with the exception of the drawing of a plankton assemblage on page 15 which is poor.

Many of the animals chosen for treatment by the author are those which tend to interact with man in a negative fashion. Much folklore has accumulated concerning several of these and the author does a good job of reporting this as well as more technical information in his attempts to reconcile fact and fiction. Economically important species form a second, large category covered in the book.

The book has two faults, one major and one minor. The major fault is the scant reference to plants. No naturalist could find his way in a strange estuary without recognizing the sign posts provided by plants and plant communities. Plants affect and reflect both the physical and the biological processes in estuaries. In his forward, the author acknowledges that Natural History—"encompasses the study of all living things" and yet only a few scattered words in the book acknowledge that plants are present at all in the Nanticoke.

The book's minor fault results from the inclusion of a list of common and scientific names of animals mentioned in the text. This list should have been omitted or prepared with enough care to eliminate all the obsolete names, misspellings, and typographical errors which it contains.

In all, the book is interesting, entertaining, and even the professional biologist will find it informative. I must say that I enjoyed reading it. (*David J. DeMont, Department of Zoology, NC State University, Raleigh.*)

Whittier, Henry O. 1982. **The Florida Botanical/Ecological Bibliography.** The Florida Native Plant Society, 935 Orange Ave., Winter Park, FL 32789. \$15 (plus \$1 mailing). 180 pp. paper.

This volume is of value to anyone who wants to know where to find information on Florida plants. The included titles are from journal articles, technical papers, and books on the flora, ecology, and related geological history. The arrangement of entries is both alphabetically by author and by subject. The data are stored on computer disks and represent an on-going project. (*Ed.*)

Diversity. A News Journal for the Plant Genetic Resources Community. Vol. 1, 1982. \$35/school and individual in N. Amer. Subscription requests: Diversity Laboratory for Information Science in Agriculture, 419 Canyon, Suite 320, Fort Collins, CO 80521.

This is a new quarterly designed to serve a rather specialized clientele as well as the biologist who wishes to keep informed about genetic engineering, genetic resources, policies made at the federal and other levels, sources of funding, important conferences, and current research topics. Whatever your role, this journal can provide a forum for airing views, research results, addressing issues, and exchanging ideas and information. This is a quality publication that should be in each college and university library. (*Ed.*)

News of Biology in the Southeast

JON R. FORTMAN—*News Editor*

Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Florida

Jacksonville University, Biology Department. A school of nursing has been established in association with Baptist Hospital of Jacksonville. The first students will be admitted in the Fall of 1983. *Dr. Ruth Stiehl* has been appointed director of the program.

University of Miami, School of Marine and Atmospheric Science. *Dr. William W. Fox, Jr.*, director of the Southeast Fisheries Center in Miami since 1978, took up the position of director of the Co-operative Institute for Marine and Atmospheric Studies. *Dr. Fox* succeeds *Dr. Claes G. H. Rooth*, Professor of meteorology and physical oceanography, who has been acting director. A native of San Diego, *Bill Fox* received his Ph.D. from the University of Washington's College of Fisheries.

Georgia

Georgia Southern College, Department of Biology. *Dr. Richard L. Osburn* was appointed as Department Head and Associate Professor in September 1982. *Dr. Osburn* (Ph.D., University of Georgia) comes to Georgia Southern from a research entomologist position held for six years as Research Leader of the Tick Research Unit, U.S. Livestock Insects Lab, ARS/USDA, Kerrville, TX. He has conducted pioneering studies, successfully hybridizing two species of cattle fever ticks to produce sterile male ticks. *Dr. James H. Oliver, Jr.*, Callaway Professor of Biology, has been notified of his appointment to a three-year term on the editorial board of the *Journal of Parasitology*. *Dr. J. B. Claiborne* (Ph.D., University of Florida) has accepted an appointment in Physiology beginning in September. *Dr. Claiborne* is completing a Post-doctoral Fellowship at the Max Plank Institute for Internal Medicine, Federal Republic of Germany. *Drs. Daniel V. Hagan* and *James H. Oliver, Jr.* presented papers at the Sixth International Congress of Acarology in Edinburgh, Scotland. *Dr. Edwin T. Hibbs* will retire July 1, 1983 after 13 years service at Georgia Southern. *Dr. Hibbs* is the past Department Head and is presently a Professor of Biology at Georgia Southern College. *Dr. Sturgis McKeever*, *Frank E. French*, and *Daniel V. Hagan* are co-chairing the NEC-26 National Biting Fly Workshop in May 1983. *Dr. John Boorman* of the British Animal Virus Research Institute, Pirbright, U.K., is the keynote speaker for the ceratopogonid-tabanid group. *Dr. James H. Oliver, Jr.*, delivered the 1982 Founder's Memorial Award Lecture at the Joint Entomological Societies of America, Canada, and Ontario meeting held in Toronto, November 1982.

Kentucky

Murray State University, Hancock Biological Station. *Dr. D. W. Johnson*, formerly Professor of Biology and Director of the Biological Station, returned to his home in West Kentucky after 15 months as a Fulbright Scholar at the Institute of Oceanography and Fisheries in Split, Yugoslavia. *Dr. Johnson* investigated environmental requirements of sea bass larvae in support of Yugoslavian culture efforts. *Dr. Johnson's* professional plans include service as a private consultant.

University of Kentucky, Department of Forestry. A "call for papers" is issued for a workshop on management of nongame species and ecological communities, June 11-12, 1984, at the University of

Kentucky, Lexington. The workshop is being sponsored by the Department of Forestry, in cooperation with the Kentucky Department of Fish and Wildlife Resources, Kentucky Nature Preserves Commission, TVA Land-Between-the-Lakes, the Daniel Boone National Forest, and the Kentucky Nature Conservancy. Subject areas to be included are: (1) inventory, including listing criteria and computerized retrieval systems; 2) management of nongame species, communities, and people; 3) monitoring methods to determine management effectiveness; and 4) current and future research. Individuals who wish to present a paper in one of the above areas should submit 250-word abstract by 15 October 1983 to: Dr. William C. McComb, Department of Forestry, University of Kentucky, Lexington, KY 40546-0073. Notification of acceptance will be made by 15 January 1984. Instructions to authors regarding format and deadlines for complete manuscripts will be provided at that time. A published proceedings of all accepted papers will follow the workshop.

Western Kentucky University, Biology Department. The Atlantic Richfield Company Foundation has awarded \$5000 to the University to be used to recruit more women students into the sciences. Under the direction of *Dr. Patricia Pearson*, Assistant Professor of Biology, a conference will be held in the fall for high school teachers in Kentucky, to discuss current career opportunities, and methods of identifying and encouraging more women to enter the fields of science and engineering.

Louisiana

The University of Southwestern Louisiana, Department of Biology. *Dr. Edmund B. Stueben*, Professor of Biology, was a member of a delegation of seventeen Entomologists, Nematologists, and Plant Pathologists that were invited to the Chinese Society of Plant Protection to visit the People's Republic of China during the month of October 1982. The delegates were selected by the Leader of the Delegation for the People to People Citizen Ambassador Program. *Dr. Nash N. Winstead*, the Provost and Vice Chancellor of North Carolina State University. *William D. Reese* will be in Brazil, April-June 1983, collecting bryophytes in the state of Pará. The collecting expedition, supported by the Projeto Flora Amazonica, will survey plants in an area of the Amazon Basin threatened by development.

Northeast Louisiana University, Biology Department. *Dr. Lawrence S. Baum* was chosen the Outstanding Researcher of the year for his work in cancer research as Director of the NLU Cancer Research Center. *Dr. Beryl C. Franklin* who served as chairman of the Meritorius Teaching Award of ASB this year was selected as Outstanding Teacher of the year. These awards are made by the NLU Alumni Association and mark the first time that both awards were earned by faculty members of the same academic department.

Mississippi

Gulf Coast Research Laboratory, Ocean Springs. Ten articles by GCRL researchers *Dr. Ervin G. Otvos* and *Dr. Gordon Gunter* appear in the recently published *Encyclopedia of Beaches and Coastal Environments*. The 940-page publication is part of the *Encyclopedia of Earth Sciences Series*, published by Hutchinson Ross Publishing Co., of Stroudsburg, Pa. *Dr. David Cook* and *Allison Perry* assisted with the Tropical and Subtropical Fisheries Technological Conference in January 1983 at Tampa, Florida. Cook, head of the microbiology section, presented a paper, while Perry, coordinator of the Office of Fisheries Assistance, chaired a session on fishing gear technology. *Dr. Lionel N. Eleuterius*, head of the botany section, has accepted an invitation to serve on the 12-member editorial review committee for the Annual Conference on Wetlands Restoration and Creation. The Board of Trustees of State Institutions of Higher Learning approved the affiliation of Xavier University of Louisiana, and the University of Arkansas at Little Rock with the Gulf Coast Research Laboratory. Xavier University is located in New Orleans and has about 2000 students, while University of Arkansas has an enrollment around 10,000. The Laboratory is now affiliated with 56 colleges and universities. *Dr. Ervin G. Otvos*, head of geology, was recently awarded a certificate of recognition by the National Wildlife Federation and Americans for the Coast for his efforts toward the passage of the Coastal Barrier Resources Act. The act establishes a federal resource system of undeveloped coastal barriers allowing these land forms to remain in their natural state. Two new college level marine science courses, Oceanography II and Carcinology, are offered during the 1983 summer teaching session at GCRL. Other first term courses are: Marine Invertebrate Zoology (May 30-July 8), Oceanography I: Physical, Chemical and Geological (June 6-July 8), Marine Microbiology (June 6-July 8), Marine Ecology (June 6-July 8), and Salt Marsh Plant Ecology (June 13-July 8). Second term courses are: Marine Vertebrate Zoology and Ichthyology (July 11-August 19), Aquaculture (July 11-August 9),

Behavior and Neurobiology of Marine Animals (July 11–August 5), Marine Botany (July 11–August 5), and Coastal Marine Geology (July 11–July 29).

North Carolina

North Carolina State University, Department of Horticultural Science. *Dr. A. Richard Bonanno* (Ph.D., 1982, Oregon State University) has joined the faculty as Assistant Professor with extension and research responsibilities for weed control in vegetables and small fruits. *Mr. Waldemar Kowalczyk*, of the Research Institute of Pomology and Floriculture, Skierniewice, Poland, joined the faculty for one year, as a visiting research assistant with *Dr. Paul V. Nelson's* program. *Dr. William B. Nesbitt* was granted disability retirement in February, 1983. The following personnel have been honored with awards: *Dr. Tom Monaco*, the WSSA Teacher Award for "Outstanding Teaching in the Field of Weed Science" and the CIBA-GEIGY Agricultural Recognition Award for "Outstanding Contributions to Agriculture"; *Dr. William B. Nesbitt*, recognized by the North Carolina Grape Growers' Association for 18 years of service and release of several grape varieties; *Dr. J. C. Raulston*, received the L. C. Chadwick Award for outstanding service as a teacher of horticulture by the American Association of Nurserymen; *Dr. Todd Wehner* was given the Marion W. Meadows Award from the American Society of Horticultural Science for his paper "Horticulture Evaluation of Eight Foliage Types of Peas Near Isogenic for Genes *af*, *tl*, and *st*"; *Mr. Melvin Kolbe* was honored with a "Honorary Lifetime Membership" by the North Carolina Peach Growers' Association, and recognized by the U.S.D.A. and Epsilon Sigma Phi for 35 years of service; *Dr. Kenneth A. Corey* received the 1983 Kenneth R. Keller Research Award for Excellence in Doctoral Dissertation Research, by Gamma Sigma Delta. *Dr. Corey's* research was directed by *Dr. Mason Pharr*; *Mr. N. F. Miller, Jr.* won the 1982 Graduate Research Award from the Eastern Region of the International Plant Propagators Society. His research was under the direction of *Drs. L. Eric Hinesley* and *Frank A. Blazich*.

North Carolina State University, Department of Botany. *Mary Menetrez* was given an "Outstanding Teaching Assistant" award with an accompanying \$1000 prize, at the spring Gamma Sigma Delta banquet, for laboratory teaching in the undergraduate plant physiology course. *Dr. G. Ray Noggle's* second edition of "Introductory Plant Physiology" was released by Prentice Hall in April 1983. *Dr. Tommy Wynn* was awarded "Outstanding Teacher" for the School of Agriculture and Life Sciences. He teaches an introductory biology course for non-science majors, and senior level cell biology course. He also serves as the departmental graduate administrator.

Western Carolina University, Biology Department. *Aaron Gillette*, a sophomore college student, sent an experiment dealing with sponges on the November 11th Space Shuttle flight. Gillette, interested in inter-cellular communication and other phenomena, has chosen sponges as the best organisms for his experiment. *Dr. F. W. Harrison* is working with Gillette on the project, and *Drs. E. Rash* (ETSU) and *G. Kayne* (Albany Medical College) are collaborating on the project. *Drs. F. W. Harrison* (WCU) and *R. R. Cowden* (ETSU) Coedited a book entitled, *Developmental Biology of Freshwater Invertebrates*. It was published by Alan R. Liss, Inc., N.Y. *Dr. William Brown*, retiring President and General Manager of Pioneer Hi-Bred International, Inc., has been awarded a grant to support his studies of the evolution of certain Cherokee corns. *Dr. Brown* will be located in the Department of Biology at Western Carolina while he carries out these studies. It is expected that *Dr. James Wallace* will be most actively involved in the work with *Dr. Brown*, and will perform chemical analyses for interpreting phylogenetic relationships of Caribbean maize. *Dr. Brown* is probably the leading authority on the evolution of the various races of maize of Latin America, and has been a world leader in the application of genetics to plant breeding techniques. His earlier work was at the University of Washington in St. Louis where he was a student and colleague of *Dr. Edgar Anderson*.

North Carolina State University, Department of Zoology. *Dr. Phillip P. Doerr* has been selected the "Wildlife Conservationist of the Year" among the 1982 Governor's Conservation Achievement Award Winners in North Carolina. *Dr. John G. Vandenbergh* has been appointed to the laboratory Animal Care Committee of the National Research Council, an arm of the National Academy of Sciences.

South Carolina

Winthrop College, Department of Biology. *Dr. James W. Johnson* (Ph.D., Univ. of Tennessee in Physiology) will join the faculty in August 1983.

Tennessee

Memphis State University, Department of Biology. *Dr. Kent Gartner*, Professor of Biology, was awarded a three-year grant to continue his study of the role of the endogenous platelet lectin in the secretion dependent aggregation of human platelets. *Dr. Guy Nesom* has been awarded a two-year grant from NSF to produce a revision of the species of *Erigeron* from Mexico and continental Central America. *Paul Hoffman* has also been given a three-year award from NIH to study the physiology and oxygen metabolism in *Legionella pneumophila*.

East Tennessee State University, Department of Biological Sciences. The following publication is announced to ASB members: *Proceedings of the Third International Symposium on the Tardigrada, August 3-6, 1980, Johnson City, Tennessee, USA.* The Editor is *Diane R. Nelson*, Department of Biological Sciences, ETSU, and the Proceedings are published by East Tennessee State University Press. This volume, containing papers presented at the symposium, provides comprehensive reviews on tardigrade biology, as well as contemporary investigations in ultrastructure, cytology, species diversity, molting, and interdisciplinary studies. To order personal, departmental, or library copies, contact the Office of Contracts and Grants, Box 19450A, ETSU, Johnson City, TN 37614-0002.

The University of Tennessee, Knoxville, Botany Department. *Dr. Edward E. C. Clebsch* has received a small award from the Research Incentive Award Fund in the use of opaline phytoliths in the paleoenvironmental reconstruction of the Central Basin of Tennessee. He was also a joint recipient with two geography professors of an award from the same source for the purchase of computer graphic hardware and the application of that hardware to complex landform analysis in the Southern Appalachians.

Virginia

Virginia Polytechnic Institute and State University, Biology Department. The Board of Visitors has announced the promotion of *Dr. Bruce Wallace* to the rank of University Distinguished Professor. This rank is reserved for not more than 1% of the faculty. Professor Wallace joined the department in 1981. A symposium on the "Biological Bases of Adaptation in Grasses" will be held during the annual meeting of the American Society of Plant Taxonomists and the AIBS in Grand Forks, North Dakota, August 1983. The symposium will address the question "Why have grasses become one of the most successful plant groups"? A special emphasis will be placed on the evolutionary role of important features in grasses such as polyploidy, hybridization, modifications, and specializations of various vegetative and reproductive structures, structural and physiological adaptations in grass leaves, and the evolutionary responses to herbivores. The symposium will consist of an invited-speakers session on Tuesday afternoon August 9, and a contributed-papers session on Wednesday morning, August 10. For further information contact *Dr. Khidir W. Hilu*, Dept. of Biology, V.P.I. & S.U., Blacksburg, VA 24601 or *Dr. Thomas Soderstrom*, Botany, Smithsonian Institution, Washington, D.C. 20560.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

The Marie Selby Botanical Gardens, Sarasota. *Dr. Calaway Dodson*, research director, left this week for South America with an unusual gift of 50 orchid plants. The orchids, *Epidendrum ilense*, will be reintroduced to their native Ecuador where they are now extinct. In May, 1976, traveling a newly cleared road into the Andes foothills, Dr. Dodson came upon a five-acre patch of just-felled forest. Prowling through the hundreds of downed trees, he discovered 62 orchid species, all of which he recognized except one, a showy white epidendrum with a very frilly lip. He returned with four specimens to Selby Gardens where, after a few months of good care and observation, the scientists realized they had an undescribed species, and Dr. Dodson published it in *Selbyana* as *Epidendrum ilense*, named after the Andes locale of its discovery, Montanas des Ila. Attempts to reproduce the orchid through self-pollination and crossing between clones kept failing, however. Six months later, Dr. Dodson returned to the same area in Ecuador, and found the original patch of felled forest already

a corn field, and much more forest cut down. He made an exhaustive search in all the Montanas de la, and the other potential western Ecuadorian Andes slopes, but found no more of the plants either then, or on succeeding trips. There is no more of that type of forest left in the region. *Epidendrum ilense* had, it seems, become extinct in the wild without even gaining the status of "endangered species." Apparently the four non-productive examples at Selby Gardens were the only ones in the world. In early 1980 at the new Eric Young Micropropagation Center at Selby Gardens, its director Lee Kuhn succeeded in "cloning" *E. ilense*. Also at about the same time, one of the now-robust plants retained a pod for 52 days that contained 10% viable seed. Reports of the success were published in the American Orchid Society Bulletin in 1981. By now, the species has increased to the extent that the orchids can be distributed commercially. A limited number were available at the Garden's annual Spring Orchids Auction and Plant Sale this past March. The 50 plants being returned to their homeland by Dr. Dodson will be turned over to the Asociacion Ecuatoriana de Orquideologia for reintroduction to Ecuador's plant kingdom under controlled conditions.

Fairchild Tropical Gardens, Miami. The *Flora of the Bahama Archipelago* by Donald S. and Helen B. Correll was published in December, 1982. Florida International University and Fairchild Gardens co-sponsored the Miami Area Plant Biology Research Seminar, March 19, 1983, in which 13 research botanists presented their results.

The Florida State Museum, University of Florida. The University of Florida has acquired a 9000-acre tract of land consisting of uplands and wetlands called the Katharine Ordway Research Preserve. It is managed jointly by the FSM and the School of Forest Resources and Conservation. In addition to the land, a private donation, matched by the Florida Legislature, was received to endow the Ordway Chair in Ecosystems Conservation, which is held by Dr. John F. Eisenberg. The Department's Mollusk Division recently acquired the University of Alabama's mollusk collection, which will make the FSM collection half again as large. The Florida State University fish collection was recently donated to the Museum.

Kentucky

The Kentucky Museum, Bowling Green. A new major exhibit, "Growing up Victorian: A Kentucky Childhood," has recently opened, and features the environments, events, and ideas that shaped childhood in 19th century Kentucky.

Mississippi

Mississippi Museum of Natural Science, Jackson. The archaeocete whale, *Zygorhiza kockii*, became the Official State Fossil on February 22, 1983. The MMNS Foundation hosted the dedication ceremonies with John Sullivan, Jr., President of the Foundation, serving as Master of Ceremonies. Following comments on the importance of the Museum to Mississippi, Governor William Winter accepted the fossil skeleton from Mrs. Sue Pitts, President of the Mississippi Gem and Mineral Society. Among the 125 MMNS supporters in attendance, were landowners, Mr. R. E. Broome, and the Travis Winter family, on whose land "Zygie" was discovered. The fossil skeleton now officially belongs to the State, and is beautifully displayed as a permanent exhibit at the Museum.

North Carolina

North Carolina State Museum of Natural History, Raleigh. The NSF has approved, for another 3-year period, Dr. Rowland M. Shelley's grant for research in millipede taxonomy and systematics. Dr. John E. Cooper, administrator of the Research and Collections Section, is on a year's leave-of-absence to complete a number of writing projects. He will continue to receive mail at the museum, edit *Brimleyana*, and curate the crustacean collections. William M. Palmer has replaced Cooper for the term of the leave, and will continue as Chief Curator of Lower Vertebrates. Ray E. Ashton, Jr., resigned as administrator of the Education Section to take a position with International Expeditions, Inc., in Birmingham, Alabama. He has been replaced by Dr. Robert Wolk, biology instructor at Greensboro College and former director of the Winston-Salem Nature Center. Fred DeShong Scott resigned as exhibits preparator, and now resides in Winston-Salem, where he is assisting the Nature Center as a volunteer. He has been replaced by Alice Allen-Grimes, who recently received her master's degree from the University of North Carolina at Wilmington. *Brimleyana*, the museum's refereed journal of southeastern zoology and paleontology, is now in its fifth year of publication. Eight issues of the twice

yearly journal have been published, and Nos. 9 and 10 are in preparation. Issues 1 through 8 contain 93 papers; 57 concern recent vertebrates, 29 about recent invertebrates, 4 are palaeontological, 2 discuss sampling and other techniques, and 1 concerns the history of the Brimley brothers for whom the journal is named. In all, 55 new taxa were described in the 8 issues.

South Carolina

In conjunction with the construction and opening of the new **Brookgreen Gardens Education Center**, two new members of the staff have been added. *Gregory C. Cornwell* comes to Brookgreen Gardens from the Charlotte Science Museums. He received his B.S. and M.S. in biology from the University of North Carolina at Charlotte, and will serve as the Education Coordinator. *Penelope E. Fouts* has been hired as Assistant Education Coordinator. She received a B.S. in marine biology from the University of North Carolina at Wilmington, and an M.S. in biology from Appalachian State University.

SYMPOSIUM

The Agricultural History Society, University of Missouri-Columbia, and Soil Conservation Service announce a symposium on the **History of Soil and Water Conservation** at Columbia, Missouri, May 24-26, 1984. Susan Flader of the university and Douglas Helms of the SCS are the symposium coordinators. Please submit proposals and requests for information to Douglas Helms, Historian, SCS-USDA, P.O. Box 2890, Washington, D.C. 20013, by September 10, 1983.

JOURNAL SALE

The **Southern Appalachian Botanical Club** is disposing of all back issues of its journal, **CASTANEA**, at the following special prices. Orders for volumes will be processed on a first come/first served basis.

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Send request and check to: *Dr. M. J. Baranski*, Sec/Treas, SABC, Dept. of Biology, Catawba College, Salisbury, NC 28144.



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The ASB

BULLETIN

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Bunched Arrowhead

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COVER

Sagittaria fasciculata (Bunched Arrowhead) is a state and nationally endangered species occurring in North Carolina. The total range of the species is Henderson County, North Carolina and Greenville County, South Carolina. There are five known populations of this species. (Drawn by *Carol Ann Moorhead* for the North Carolina Plant Conservation Program. See the article by Sutter et al. in this issue.)

TIME AND PLACE OF FUTURE MEETINGS

1984	April 11-14	Memphis State University
1985	April 10-13	Middle Tennessee State University, Murfreesboro
1987		University of Georgia, Athens (50th Anniversary)

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Endangered, Threatened, and Rare Plant Species of North Carolina: A Revised List

Robert D. Sutter, Laura Mansberg

*Plant Conservation Program, North Carolina
Department of Agriculture
and*

Julie Moore

*Natural Heritage Program, North Carolina Department of
Natural Resources and Community Development*

A revised list of the Endangered, Threatened, Special Concern, Primary Proposed, and Significantly Rare Species of North Carolina is presented. Accompanying the list is a summary of the information and criteria used in its development and definitions of each status category. The list is based on substantial new data gathered by researchers and staff of the two state agencies charged with the protection of North Carolina's endangered and rare plants, as well as information derived from floras, atlases, Natural Heritage data banks, taxonomic revisions and monographs, and taxonomic specialists. Obtaining data from a variety of sources, basing the list on quantifiable biological and threat data, and establishing specific criteria for the list categories has resulted in a list that more accurately reflects biological rarity than many other state lists.

The list is presented to increase awareness of these rare species within the regional community of planners, policy-makers, educators, conservationists, researchers, and naturalists. The authors welcome any additional data or comments on any of the species listed or not listed below.

INTRODUCTION

The understanding of the status of North Carolina's rare plants has improved substantially since the last publication of a comprehensive list of rare and endangered species (Cooper et al. 1977). That list was compiled for the symposium on North Carolina Endangered and Threatened Plants and Animals held in 1975 and had no official legal status. The amount of available information on rare plant species has increased over the last seven years as a result of the establishment of two state agencies that actively research and protect rare species. Several major rare plant species surveys and graduate research projects on rare species and significant state natural areas have also contributed to this evolving base of information. The refinement of knowledge of the biological and threat status of many of these rare plants has rendered the earlier list obsolete, necessitating the publication of an improved, revised list.

The Plant Conservation Program, in North Carolina's Department of Agriculture, has been the focal point of efforts to produce a revised state listing of rare and endangered plant species. The Program was established in 1979 with passage

of the Plant Protection and Conservation Act (GS 19b 106-202.12-106-202.19) and consists of an endangered species botanist, an advisory scientific committee, and a regulatory board. The program is the legal agency in North Carolina responsible for the monitoring, surveillance, listing, and protection of endangered and threatened plant species. The North Carolina Natural Heritage Program in the Department of Natural Resources and Community Development has assisted in this effort. This agency, the states' natural areas program, maintains a data bank of occurrences of rare animal and plant species on computer and topographic maps. The Natural Heritage list of 430 plant species originated from the list compiled at the 1975 symposium (Cooper et al. 1977).

The new list of rare and endangered plant species differs from the earlier symposium list in several ways. Species listed as Endangered, Threatened, and Special Concern are legally protected in North Carolina by provisions of the Plant Protection and Conservation Act. Several additional categories, Primary Proposed and Significantly Rare Species, have also been established to more precisely communicate the biological and threat status of species not currently listed as Endangered or Threatened. A wider variety of sources were used in the development of the list. In addition to the use of herbaria and published floras, important data were obtained from: several years of field work carried out by staffs of both the Plant Conservation and Natural Heritage Programs, publications on the endangered and threatened plants of adjacent states (Porter 1979; Linzey 1979; Clarkson et al. 1981; Branson et al. 1981), recently published atlases and checklists (Harvill et al. 1977, 1981; Wherry et al. 1979; Duncan and Kartesz 1981), Natural Heritage data banks from South Carolina, West Virginia, Tennessee, and the Tennessee Valley Authority, and available taxonomic revisions and monographs. Further assistance was provided by the endangered species botanists in adjacent states and taxonomic specialists, in particular, contributors to the Vascular Flora of the Southeastern United States Project. The comprehensive species information obtainable through such a broad spectrum of resources has directly enhanced the quality of status determinations: they reflect biological rarity and endangerment more accurately than previous assessments did and the list itself is more consistent internally. While these improvements are significant, any endangered or rare species list is dynamic, changing as new data become available and protection activities are implemented.

APPROACH

For each rare species on the Natural Heritage List, the following information was compiled:

- (1) distribution in North Carolina, including counties and number of occurrences, physiographic province(s), and the number of populations verified within the last five years;
- (2) total geographic range of the species;
- (3) distribution in adjacent states, including number of records per state, county, and physiographic province, number of recently verified populations, and current proposed or legal state status;
- (4) habitat throughout the species' range and in North Carolina;
- (5) phenology and species biology;

- (6) taxonomic data, including pertinent synonyms, taxonomic problems, difficulties in identification; and
- (7) references.

After compilation of these data for some 400 plant species, maps were developed depicting county distribution and numbers of populations, when available, for the region from Pennsylvania, south through Florida and west to the Mississippi River. These mapped data will be available in a future publication. Review of the compiled data and distribution maps led to the final assessment of status for these rare plant species. The set of criteria developed during this review process became the primary tool used to achieve accurate status determination and internal consistency.

The degree to which a species is endangered is most easily evaluated by examining its range, the distribution of the habitat in which it occurs, and the number of populations known. Narrowly endemic species with few populations, species rare throughout their range, and widely disjunct species were given higher priority than species with wider distributions. Endemic species are the most critical species for protection, for they may represent centers of endemism, the process of speciation, remnants of earlier floras, and in many instances they occur in unique habitats. Their restricted range usually means that only a few states, if not a single one, must see to their protection. Of the listed species, 26% are endemic, either to the state, the Southern Appalachians, or the Coastal Plain of the Carolinas. Species which are rare throughout their range are also given a high status; 32% of the species listed here are rare throughout their range.

The importance of listing disjunct species as endangered or threatened increases with the distance of the disjunction from the species' main range, and the rarity of the species in adjacent states. The importance of listing is inversely proportional to the number of populations in the disjunct portion of the species' range. The disjunct species listed here (42% of the listed species) are for the most part separated from the main range of the species by over 350 miles (600 km), are listed as rare or endangered in adjacent states, and have fewer than five populations in North Carolina. Disjunct species are appropriate candidates for listing as endangered or threatened and should be considered a significant component of a state's natural heritage. A disjunct population of a species may differ genetically from populations within the main body of its range, such that the population is a potential progenitor of a new species. Disjunct species also reflect the climatic and vegetational history of the state over the last 10,000 years. They also usually occur in unique habitats.

In addition to range, distribution, and population number, other aspects of species biology and ecology were considered during the evaluation of biological and threat status of each species. Reproductive biology—for example: seed set potential, mode of vegetative reproduction, tendency toward weediness—was noted where possible. Dates of last observation for each population were also useful (if a population was not observed in the last five years, it was considered unverified). Probably most valuable was documentation of threats to the species or its habitat. Destruction or alteration of a species' habitat will drastically reduce that species' chance for survival. Today, in North Carolina, the most well-known cases of species endangerment through habitat alteration involve the drainage of wetlands, both in the Coastal Plain and in the mountains, and the suppression of

fire in habitats that have historically been fire maintained. Also, if a species is known to be collected from the wild for commercial or other reasons, it may merit a higher status than it would be assigned on the basis of distribution or biology.

DEFINITION OF STATUS CATEGORIES

Five categories have been established for the purpose of summarizing the current biological status of North Carolina rare plants. These categories also functionally rank the species in terms of the degree to which their survival is jeopardized.

Three categories are defined by law in the Plant Protection and Conservation Act (General Statute 19b 106-202.12–106-202.19), and each of these affords some protection to listed plants. They are:

Endangered (E). Any species or higher taxon of plant whose continued existence as a viable component of the State's flora is determined to be in jeopardy.

Threatened (T). Any species of plant likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range.

Special Concern (SC). Any species of plant which requires population monitoring, but which may be collected and sold under regulations.

Endangered and Threatened species are those very near extinction. There are very few populations of these species, they are limited in distribution, and there is evidence of threats that are extirpating or reducing the vigor of populations. Species designated as Endangered or Threatened by the U.S. Fish and Wildlife Service are also included as Endangered or Threatened on the North Carolina List.

The third category, Special Concern, primarily includes plants in the horticultural trade or ones known to be extensively collected from the wild. An example of a species in this category is Ginseng (*Panax quinquefolium*); it is too common to be considered Endangered or Threatened but is extensively collected from the wild, particularly in the mountains of North Carolina. Special regulations provide for close monitoring of the collection and trade in this species.

The fourth and fifth categories used in our status classification system concern rare species that are not endangered or threatened in the state, but which are rare enough to warrant either monitoring or study. These two categories are similar in concept, though not equivalent, to the categories used by the U.S. Fish and Wildlife Service to review species for Federal Endangered or Threatened status. These additional categories are:

Primary Proposed (PP). Any species for which there is no evidence of declining populations or threats to the species, but which because of small numbers of populations, rare habitat, or distribution, may become threatened in the future; or a species suspected of being endangered or threatened, but for which sufficient information is not currently available to biologically support such a status classification.

Significantly Rare Species (SRS). Any species which has not been determined as an E, T, SC, or PP species, but which has been determined to need continued monitoring. The status of many of the species in this category is undetermined. This category includes several different types of "rare" species: species whose

taxonomic identity is somewhat doubtful or unresolved and for which further research is needed before its biological status in the state can be determined; species that are frequently overlooked in the field or seldom identified, but which are suspected of being more common than present data indicate; and peripheral species whose range barely includes North Carolina, but which occur in limited frequency in adjacent states.

The extent of monitoring, status review, and protection for Primary Proposed and Significantly Rare species differ. The goal for Primary Proposed species is to attempt to monitor each population biennially and, if warranted, work toward protection. Significantly Rare Species are not subject to major field activities, rather their status is reviewed every two years to determine whether they need further field monitoring and protection.

The quality of any endangered species list depends, first, on the accuracy of the information used to determine rarity of the species and, second, on the establishment of status categories with precise definitions. In order to access biological rarity, the most accurate data have been sought from a wide range of sources. Additionally, the degree of threat to the species from habitat alteration and destruction and from collection were considered. This process has resulted in a list that accurately reflects biological rarity and prioritizes plant conservation efforts in North Carolina.

PLANT LIST

The following is the official list of Endangered, Threatened, Special Concern, Primary Proposed, and Significantly Rare plant species in North Carolina. It supercedes all previous lists. Nomenclature follows Kartesz and Kartesz (1980) with a few modifications reflecting more current taxonomic status.

To be included on the mailing list of the Plant Conservation Program, write to the program, North Carolina Department of Agriculture, P.O. Box 27647, Raleigh, North Carolina 27611. Individuals on the mailing list receive information on proposed changes to the plant list.

<i>Aconitum reclinatum</i>	PP	<i>Anemone berlandieri</i>	PP
Trailing Wolfsbane		Southern Thimbleweed	
<i>Adiantum capillus-veneris</i>	SRS	<i>Angelica atropurpurea</i>	PP
Venus Hair Fern		Purple Angelica	
<i>Aeschynomene virginica</i>	SRS	<i>Arabis glabra</i>	SRS
Sensitive Joint-vetch		Tower Mustard	
<i>Adlumia fungosa</i>	SRS	<i>Arabis laevigata</i> var. <i>burkii</i>	SRS
Climbing Fumitory		Porter's Rockcress	
<i>Agalinus aphylla</i>	SRS	<i>Arabis patens</i>	PP
Scale-leaf Gerardia		Spreading Rockcress	
<i>Agropyron trachycaulum</i>	PP	<i>Arenaria alabamensis</i>	E
Slender Wheatgrass		Alabama Sandwort	
<i>Agrostis borealis</i>	PP	<i>Arenaria godfreyi</i>	E
Artic Bent Grass		Godfrey's Sandwort	
<i>Amaranthus pumilus</i>	PP	<i>Arenaria uniflora</i>	E
Dwarf Amaranth		Single-flowered Sandwort	
<i>Amorpha georgiana</i>	SRS	<i>Arcthusa bulbosa</i>	T
Georgian Amorpha		Bog Rose	

<i>Asclepias pedicellata</i>	PP	<i>Cardamine angustata</i> var.	SRS
Stalked Milkweed		<i>multifida</i>	
<i>Asplenium bradleyi</i>	SRS	Divided Toothwort	
Bradley's Spleenwort		<i>Cardamine douglassii</i>	SRS
<i>Asplenium heteroresiliens</i>	E	Douglass' Bittercress	
Carolina Spleenwort Fern		<i>Cardamine longii</i>	SRS
<i>Asplenium monanthes</i>	E	Long's Bittercress	
Single Sorus Spleenwort Fern		<i>Cardamine micranthera</i>	SRS
<i>Asplenium ruta-muraria</i>	SRS	Small-anthered Bittercress	
Wall-rue Spleenwort		<i>Cardamine rotundifolia</i>	SRS
<i>Aster avitus</i>	PP	Mountain Watercress	
Alexander's Rock Aster		<i>Carduus carolinianus</i>	SRS
<i>Aster carolinianus</i>	SRS	Carolina Thistle	
Climbing Aster		<i>Carex aenea</i>	E
<i>Aster commixtus</i>	SRS	Fernald's Hay Sedge	
Wood's Aster		<i>Carex barrattii</i>	PP
<i>Astilbe crenatiloba</i>	SRS	Barratt's Sedge	
Roan False Goat's Beard		<i>Carex biltmoreana</i>	E
<i>Bacopa cyclophylla</i>	SRS	Biltmore Sedge	
Water-Hyssop		<i>Carex buxbaumii</i>	PP
<i>Balduina atropurpurea</i>	PP	Buxbaum's Sedge	
Honeycomb Head		<i>Carex canescens</i> var. <i>disjuncta</i>	PP
<i>Baptisia australis</i>	SRS	Silvery Sedge	
Blue Wild Indigo		<i>Carex chapmanii</i>	T
<i>Betula papyrifera</i> var.	PP	Chapman's Sedge	
<i>cordifolia</i>		<i>Carex cherokeeensis</i>	SRS
Mountain Paper Birch		Cherokee Sedge	
<i>Botrychium alabamense</i>	SRS	<i>Carex collinsii</i>	SRS
Alabama Grape-fern		Collin's Sedge	
<i>Botrychium lanceolatum</i>	SRS	<i>Carex conoidea</i>	PP
Lance-leaf Grape-fern		Cone-shaped Sedge	
<i>Botrychium lunarioides</i>	PP	<i>Carex cristatella</i>	SRS
Winter Grape-fern		Small Crested Sedge	
<i>Botrychium matricariaefolium</i>	SRS	<i>Carex decomposita</i>	SRS
Daisy-leaf Grape-fern		Cyress Knee Sedge	
<i>Botrychium oneidense</i>	PP	<i>Carex eburnea</i>	SRS
Blunt-lobed Grape-fern		Bristle-leaved Sedge	
<i>Botrychium simplex</i>	PP	<i>Carex exilis</i>	PP
Least Grape-fern		Coast Sedge	
<i>Buckleya distichophylla</i>	E	<i>Carex gravida</i> var. <i>lunelliana</i>	SRS
Piratebush		A Sedge	
<i>Bumelia tenax</i>	SRS	<i>Carex misera</i>	T
Tough Bumelia		Wretched Sedge	
<i>Cacalia rugelia</i>	T	<i>Carex projecta</i>	PP
Rugel's Ragwort		Necklace Sedge	
<i>Cacalia suaveolens</i>	PP	<i>Carex purpurifera</i>	E
Sweet Indian Plantain		Purple Sedge	
<i>Calamagrostis porteri</i>	SRS	<i>Carex reniformis</i>	SRS
Porter's Reedgrass		Kidney Sedge	
<i>Calamovilfa brevipilis</i>	T	<i>Carex schweinitzii</i>	PP
Riverbank Sandreed		Schweinitz's Sedge	
<i>Calystegia sericata</i>	PP	<i>Carex tenax</i>	SRS
Blue Ridge Bindweed		Strong Sedge	
<i>Camassia scilloides</i>	E	<i>Carex tetanica</i>	SRS
Wild Hyacinth		Rigid Sedge	
<i>Campanula aparinoides</i>	SRS	<i>Carex turgescens</i>	SRS
Marsh Bellflower		Swollen Sedge	
		<i>Carex trisperma</i>	SRS
		Three-seeded Sedge	

<i>Carex woodii</i>	SRS	<i>Epilobium leptophyllum</i>	PP
Wood's Sedge		Narrowleaf Willowherb	
<i>Carya myristiciformis</i>	T	<i>Eriocaulon lineare</i>	E
Nutmeg Hickory		Linear Pipewort	
<i>Cheilanthes alabamensis</i>	SRS	<i>Eriocaulon parkeri</i>	SRS
Alabama Lip-fern		Parker's Pipewort	
<i>Chrysoma paucifloculosa</i>	SRS	<i>Eriocaulon septangulare</i>	SRS
Chrysoma		Seven-angled Pipewort	
<i>Clematis glaucophylla</i>	SRS	<i>Eulophia ecristata</i>	PP
Whiteleaf Leatherflower		Eulophia	
<i>Clematis occidentalis</i>	SC	<i>Eupatorium resinosum</i>	E
Purple Virgin's Bower		Resinous Joe-pye-weed	
<i>Collinsonia verticillata</i>	PP	<i>Euphorbia purpurea</i>	PP
Whorled Horsebalm		Glade Spurge	
<i>Commelina caroliniana</i>	SRS	<i>Filipendula rubra</i>	PP
Carolina Dayflower		Queen-of-the-Prairie	
<i>Coreopsis latifolia</i>	E	<i>Gale palustris</i>	SRS
Broadleaf Coreopsis		Sweet Gale	
<i>Cyperus dentatus</i>	PP	<i>Gentiana alba</i>	SRS
Toothed-leaf Flatsedge		Yellow Gentian	
<i>Cyperus lecontei</i>	SRS	<i>Gentiana crinita</i>	E
Leconte's Flatsedge		Fringed Gentian	
<i>Cyperus tetragonus</i>	SRS	<i>Geum aleppicum</i>	PP
Four-angled Flatsedge		Yellow Avens	
<i>Cystopteris</i> × <i>tennesseensis</i>	E	<i>Geum geniculatum</i>	T
Tennessee Bladder Fern		Bent Avens	
<i>Dalibarda repens</i>	E	<i>Geum laciniatum</i>	SRS
False Violet		Rough Avens	
<i>Delphinium exaltatum</i>	E	<i>Geum radiatum</i>	T
Tall Larkspur		Spreading Avens	
<i>Deschampsia caespitosa</i>	PP	<i>Gillenia stipulata</i>	SRS
var. <i>glauca</i>		Indian Physic	
Tufted Hairgrass		<i>Glyceria nubigena</i>	E
<i>Dicentra eximia</i>	SRS	Smoky Mountain Mannagrass	
Bleeding Heart		<i>Glyceria pallida</i>	SRS
<i>Dionaea muscipula</i>	SRS	Pale Mannagrass	
Venus Flytrap		<i>Grammitis nimbata</i>	E
<i>Disporum maculatum</i>	SRS	Dwarf Polypody Fern	
Nodding Mandarin		<i>Gymnocarpium dryopteris</i>	PP
<i>Draba ramosissima</i>	SRS	Oak Fern	
Branching Draba		<i>Habenaria integra</i>	T
<i>Draba reptans</i>	SRS	Yellow Fringeless Orchid	
Creeping Draba		<i>Habenaria integrilabia</i>	PP
<i>Drosera filiformis</i>	SRS	White Fringeless Orchid	
Thread-leaf Sundew		<i>Habenaria peramoena</i>	PP
<i>Echinacea laevigata</i>	T	Purple Fringeless Orchid	
Smooth Coneflower		<i>Halodule beaudettei</i>	SRS
<i>Echinacea pallida</i>	PP	Beaudette's Shoalweed	
Pale Coneflower		<i>Hedyotis purpurea</i> var. <i>montana</i>	SRS
<i>Echinacea purpurea</i>	SRS	Mountain Bluet	
Purple Coneflower		<i>Helenium brevifolium</i>	SRS
<i>Eleocharis cellulosa</i>	SRS	Littleleaf Sneezeweed	
Gulferest Spikerush		<i>Helenium pinnatifidum</i>	SRS
<i>Eleocharis halophila</i>	T	Dissected Sneezeweed	
Salt Spikerush		<i>Helianthemum bicknellii</i>	PP
<i>Eleocharis robbinsii</i>	SRS	Plains Frostweed	
Robbin's Spikerush		<i>Helianthemum propinquum</i>	PP
<i>Epilobium ciliatum</i>	SRS	Creeping Sunrose	
Purple Willowherb			

<i>Helianthemum rosemarinifolium</i>	SRS	<i>Liatris helleri</i>	T
Rosemary Frostweed		Heller's Blazing Star	
<i>Helianthus glaucophyllus</i>	PP	<i>Liatris squarrulosa</i>	SRS
Whiteleaf Sunflower		Earl's Blazing Star	
<i>Helianthus laevigatus</i>	SRS	<i>Liatris turgida</i>	SRS
Smooth Sunflower		Shale-barrens Blazing Star	
<i>Helianthus schweinitzii</i>	E	<i>Lilaeopsis carolinensis</i>	T
Schweinitz's Sunflower		Carolina Lilaeopsis	
<i>Helonias bullata</i>	T	<i>Lilium grayi</i>	T
Swamp Pink		Gray's Lily	
<i>Heterotheca pilosa</i>	SRS	<i>Lilium philadelphicum</i>	SRS
Hairy Telegraphplant		Wood Lily	
<i>Hexastylis contracta</i>	E	<i>Limosella subulata</i>	PP
Mountain Heart Leaf		Awl-leaf Mudwort	
<i>Hexastylis lewisii</i>	PP	<i>Lindera melissaefolia</i>	E
Lewis' Heart Leaf		Southern Spicebush	
<i>Hexastylis naniflora</i>	E	<i>Lindernia saxicola</i>	SRS
Dwarf-flowered Wild Ginger		Rock False Pimpernel	
<i>Hierochloa odorata</i>	PP	<i>Liparis loeselii</i>	SRS
Sweet Grass		Loesel's Twayblade	
<i>Hudsonia montana</i>	T	<i>Listera australis</i>	SRS
Mountain Golden Heather		Southern Twayblade	
<i>Hudsonia tomentosa</i>	SRS	<i>Listera cordata</i>	SRS
Woollybush Heather		Heart-leaved Twayblade	
<i>Hydrastis canadensis</i>	E	<i>Lithospermum canescens</i>	SRS
Goldenseal		Hoary Pucoon	
<i>Hypericum adpressum</i>	PP	<i>Litsea aestivalis</i>	SRS
Bog St. John's-wort		Pondspice	
<i>Hypericum frondosum</i>	PP	<i>Lobelia boykinii</i>	PP
Golden St. John's-wort		Boykin's Lobelia	
<i>Hypoxis rigida</i>	SRS	<i>Lonicera flava</i>	SRS
Stiff-leaved Yellow		Yellow Honeysuckle	
Star-grass		<i>Ludwigia alata</i>	SRS
<i>Hypoxis sessilis</i>	SRS	Winged Seedbox	
Sessile-flowered Yellow		<i>Ludwigia lanceolata</i>	SRS
Star-grass		Lanceleaf Seedbox	
<i>Ilex amelanchnier</i>	E	<i>Ludwigia linifolia</i>	SRS
Sarvis Holly		Flaxleaf Seedbox	
<i>Isoetes piedmontana</i>	T	<i>Ludwigia microcarpa</i>	SRS
Piedmont Quillwort		Tiny-fruited Seedbox	
<i>Isoetes riparia</i>	SRS	<i>Lycopodium porophyllum</i>	SRS
Riverbank Quillwort		Rock Clubmoss	
<i>Isopyrum biternatum</i>	SRS	<i>Lycopodium selago</i>	SRS
Atlantic Isopyrum		Fir Clubmoss	
<i>Isotria medeoloides</i>	E	<i>Lysimachia asperulaefolia</i>	E
Small Whorled Pogonia		Rough-leaf Loosestrife	
<i>Juncus trifidus</i> ssp.	E	<i>Lysimachia fraseri</i>	PP
carolinianus		Fraser's Loosestrife	
One-flowered Rush		<i>Macbridea caroliniana</i>	SRS
<i>Juniperus communis</i> var.	SRS	Carolina Bogmint	
depressa		<i>Malaxis spicata</i>	SRS
Ground Juniper		Florida Adder's Mouth	
<i>Kalmia cuneata</i>	E	<i>Marshallia grandiflora</i>	SRS
White Wicky		Barbara's Buttons	
<i>Lechea torreyi</i>	PP	<i>Marshallia trinervia</i>	SRS
Torrey's Pinweed		Barbara's Buttons	
<i>Liatris aspera</i>	SRS	<i>Meehania cordata</i>	SRS
Rough Gayfeather		Meehania	

<i>Melica nitens</i>	SRS	<i>Psoralea macrophylla</i>	E
Three-flowered Melic		Bigleaf Scurfpea	
<i>Menyanthes trifoliata</i>	T	<i>Prilimnium costatum</i>	SRS
Buckbean		Ribbed Mock Bishop's-weed	
<i>Miliun effusum</i>	PP	<i>Ptilimnium nodosum</i>	T
Millet Grass		Bishop's-weed	
<i>Monotropsis odorata</i>	SRS	<i>Pyxidantha barbulata</i> var.	E
Sweet Pinesap		<i>brevifolia</i>	
<i>Muhlenbergia glomerata</i>	PP	Well's Pyxie-moss	
Bristly Muhly		<i>Ranunculus ambigens</i>	SRS
<i>Myriophyllum laxum</i>	T	Water-plantain-spearwort	
Loose Watermilfoil		<i>Ranunculus flabellaris</i>	SRS
<i>Myriophyllum tenellum</i>	PP	Yellow Water-crowfoot	
Leafless Watermilfoil		<i>Ranunculus hederaceus</i>	PP
<i>Nartheicum americanum</i>	E	Ivy Buttercup	
Bog Asphodel		<i>Rhexia aristosa</i>	PP
<i>Nemopanthus collinus</i>	T	Awned Meadow-beauty	
Long-stalked Holly		<i>Rhexia cubensis</i>	SRS
<i>Nestronia umbellula</i>	T	Cuban Meadow-beauty	
Nestronia		<i>Rhexia virginica</i> var. <i>purshii</i>	SRS
<i>Oenothera perennis</i>	SRS	Common Meadow-beauty	
Perennial Sundrops		<i>Rhododendron bakeri</i>	SRS
<i>Pachysandra procumbens</i>	SRS	Cumberland Azalea	
Alleghany Spurge		<i>Rhododendron roseum</i>	SRS
<i>Panax quinquefolium</i>	SC	Election Pink	
Ginseng		<i>Rhododendron vaseyi</i>	SC
<i>Panax trifolium</i>	SRS	Pink-shell Azalea	
Dwarf Ginseng		<i>Rhus michauxii</i>	E
<i>Parnassia caroliniana</i>	E	Michaux's False Sumac	
Carolina Grass-of-Parnassus		<i>Rhynchospora alba</i>	PP
<i>Parnassia grandifolia</i>	PP	White Beak-rush	
Large-leaved Grass-of-		<i>Rhynchospora breviseta</i>	SRS
Parnassus		Shortbristled Beak-rush	
<i>Pedicularis lanceolata</i>	SRS	<i>Rhynchospora odorata</i>	SRS
Swamp Lousewort		Fragrant Beak-rush	
<i>Pellaea × wrightiana</i>	E	<i>Rhynchospora pleiantha</i>	SRS
Wright's Cliff-brake Fern		Coastal Beak-rush	
<i>Peltandra sagittifolia</i>	SRS	<i>Rhynchospora stenophylla</i>	PP
Spoon Flower		Littleleaf Beak-rush	
<i>Peplis diandra</i>	SRS	<i>Rhynchospora tracyi</i>	SRS
Water Purslane		Tracy's Beak-rush	
<i>Phacelia ranunculacea</i>	PP	<i>Rubus idaeus</i> var. <i>canadensis</i>	SRS
Buttercup Phacelia		Red Raspberry	
<i>Phlox subulata</i>	SRS	<i>Rudbeckia heliopsisidis</i>	T
Moss Pink		Sun-facing Coneflower	
<i>Plantago cordata</i>	E	<i>Rudbeckia triloba</i> var.	SRS
Heart-leaf Plantain		<i>pinnatiloba</i>	
<i>Plantago sparsiflora</i>	SRS	Pinnate-lobed Black-eyed	
Pineland Plantain		Susan	
<i>Poa saltuensis</i>	SRS	<i>Ruellia humilis</i>	SRS
Bluegrass		Low Wild-petunia	
<i>Polygonella articulata</i>	PP	<i>Sabatia kennedyana</i>	PP
Coast Jointweed		Sea Pink	
<i>Portulaca smallii</i>	E	<i>Sageretia minutiflora</i>	SRS
Small's Portulaca		Small-flowered Buckthorn	
<i>Potamogeton confervoides</i>	PP	<i>Sagittaria fasciculata</i>	E
Conferva Pondweed		Bunched Arrowhead	
<i>Prenanthes roanensis</i>	SRS	<i>Sarracenia jonesii</i>	E
Roan Rattlesnakeroot		Mountain Sweet Pitcher Plant	

<i>Saxifraga caroliniana</i>	PP	<i>Stellaria corei</i>	SRS
Carolina Saxifrage		Core's Starwort	
<i>Saxifraga pensylvanica</i>	PP	<i>Streptopus amplexifolius</i>	PP
Swamp Saxifrage		White Mandarin	
<i>Sclisandra glabra</i>	T	<i>Synandra hispidula</i>	PP
Magnoliavine		Synandra	
<i>Schwalbea americana</i>	PP	<i>Taxus canadensis</i>	SRS
Chaffseed		American Yew	
<i>Scirpus acutus</i>	SRS	<i>Thalictrum cooleyi</i>	E
Hardstem Bulrush		Cooley's Meadowrue	
<i>Scirpus cespitosus</i> var. <i>callosus</i>	SRS	<i>Thaspium pinnatifidum</i>	SRS
Deerhair Bulrush		Mountain Thaspium	
<i>Scirpus subterminalis</i>	SRS	<i>Thelypteris phegopteris</i>	PP
Swaying Rush		Northern Beech-fern	
<i>Scutellaria nervosa</i>	SRS	<i>Trichomanes boschianum</i>	T
Veined Skullcap		Appalachian Filmy-fern	
<i>Scutellaria parvula</i>	SRS	<i>Trichomanes petersii</i>	T
Small Skullcap		Peter's Filmy-fern	
<i>Scutellaria saxatilis</i>	SRS	<i>Tridens carolinianus</i>	SRS
Rock Skullcap		Carolina Triodia	
<i>Sedum pusillum</i>	E	<i>Tridens strictus</i>	SRS
Puck's Orpine		Spike Triodia	
<i>Sedum rosea</i>	E	<i>Trillium discolor</i>	PP
Roseroot		Mottled Trillium	
<i>Senecio millefolium</i>	T	<i>Trillium pusillum</i>	E
Divided-leaf Ragwort		Carolina Trillium	
<i>Senecio pauperculus</i>	SRS	<i>Trillium sessile</i>	SRS
Balsam Groundsel		Sessile-flowered Trillium	
<i>Senecio schweinitzianus</i>	E	<i>Trisetum spicatum</i> var. <i>molle</i>	E
Schweinitz's Groundsel		Soft Trisetum	
<i>Seymeria pectinata</i>	SRS	<i>Urtica chamaedryoides</i>	SRS
Sticky Afzelia		A Stinging Nettle	
<i>Shortia galacifolia</i>	E	<i>Utricularia geminiscapa</i>	SRS
Oconee Bells		Two-flowered Bladderwort	
<i>Silene ovata</i>	PP	<i>Utricularia minor</i>	PP
Mountain Catchfly		Lesser Bladderwort	
<i>Silphium terebinthaceum</i>	PP	<i>Utricularia olivacea</i>	T
Prairie Dock		Dwarf Bladderwort	
<i>Solidago pulchra</i>	E	<i>Vaccinium macrocarpon</i>	PP
Carolina Goldenrod		Cranberry	
<i>Solidago spithamea</i>	E	<i>Veronica americana</i>	SRS
Blue Ridge Goldenrod		American Speedwell	
<i>Solidago uliginosa</i>	SRS	<i>Viola tripartita</i>	SRS
Bog Goldenrod		Three-parted Violet	
<i>Solidago verna</i>	E	<i>Warea cuneifolia</i>	SRS
Spring-flowering Goldenrod		Carolina Warea	
<i>Sparganium chlorocarpum</i>	SRS	<i>Woodsia ilvensis</i>	SRS
Greenfruit Bur-reed		Rusty Woodsia	
<i>Spiraea virginiana</i>	PP	<i>Woodsia scopulina</i>	SRS
Virginia Spiraea		Alleghany Cliff Fern	
<i>Spiranthes laciniata</i>	PP	<i>Xyris brevifolia</i>	SRS
Lace-lip Ladies'-tresses		Short-leaf Yellow-eyed Grass	
<i>Spiranthes longilabris</i>	PP	<i>Xyris elliottii</i>	SRS
Long-lip Ladies'-tresses		Elliott's Yellow-eyed Grass	
<i>Sporobolus heterolepis</i>	E	<i>Zigadenus glaucus</i>	PP
Prairie Dropseed		White Camass	
<i>Sporobolus teretifolius</i>	T		
Wireleaf Dropseed			

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Association Affairs

MISSING LINKS

Past-president's address presented at the Banquet, April 15, 1983, by **Dr. J. Frank McCormick**, Professor and Director, Program in Ecology, University of Tennessee, Knoxville.

In his opening remarks last year, Frank Flint explained that past presidents have used this occasion to reminisce, to inform, to provoke, or to entertain their audiences. My intention is to briefly reminisce, primarily to inform, and only occasionally to provoke.

I wish to reminisce briefly about becoming a southeastern biologist. There is no audience more appropriate than this one with which I can share these reflections upon the past. I came to the Southeast in 1958 as a naive, aggressive, graduate student at Emory University. Anxious to study ecology, I was forced to study biology. The faculty was dedicated to providing a rigorous, balanced, and comprehensive education in biological science. In spite of my strongest efforts to the contrary, I received a liberal education in biology. For example, during comprehensive written exams I was unable to avoid seemingly non-ecological questions such as, "discuss the ontogeny and phylogeny of the inner ear." Now, twenty-five years later this is considered evolutionary ecology and my education is suddenly relevant. A minor success, in my otherwise futile resistance to a proper education, was to become the only student to graduate without laboring through Dr. Burbank's protozoology course. The loss was entirely mine! I was fortunate to receive my education from a faculty, which knew better than I, the education I would need. Their holistic philosophy prevailed at a time when rapid advances in reductionist methods tempted others to implement narrowly conceived curricula designed to produce narrow minded biologists.

The most profound influence upon my graduate education came from a cytologist—perhaps the best biologist I've known. Three times he was the recipient of the ASB research award, an accomplishment unequaled except by his wife as co-author. Yet, he was even better as a teacher. Alvin Beatty taught us the difference between merely learning biology, and being a biologist. He provided much needed advice, direction, and measured criticism. More than a prescription for professional development, he provided a lesson by example. Beyond challenging our intellect and evaluating our knowledge, he was genuinely concerned with our future in biological science. This concern, expressed in the form of career guidance, provided a terribly important, often underestimated, LINK between knowing biology and becoming a biologist. Career guidance is, in fact, one of the "missing links" I wish to discuss with you this evening.

A chain is only as strong as its weakest link. This truism is commonly used to inspire teamwork and cooperation. An ecologist is more likely to compare a chain to an ecosystem. Both have properties which surpass those of individual uncoupled components. This truism also provides a framework within which I can discuss two topics which concern me very much.

First, I would like for you to visualize a section of chain in which individual links are the experiences, opportunities, and requirements which comprise the education of a biologist. Once you have accepted this analogy, carry it one step further. A chain which lies unused in the corner of a barn becomes rusty, is of little value, is unproductive, and probably gets in the way. The same may be said of unemployed biologists. The most productive biologists in the world are those who are employed. It was certainly clear to Alvin Beatty that the best of what he had to offer us might be diminished or wasted if we failed to develop productive careers. The fragment of chain representing education must be linked to another fragment representing professional development. The connecting link, career guidance and career preparation, is too often missing or is the weakest link in the chain. This link needs to be stronger today than when I was a student. Today, biologists fill a greater variety of roles useful to society. However, even as diversity of opportunity increases, it is increasingly difficult to obtain employment of any kind. Students earning biology degrees within colleges of liberal arts are, for the most part, unprepared to compete for jobs against other scientists and engineers. What can we do to better prepare our students for jobs which do exist? How can we provide a missing link? To understand the profession as well as the science, students need an historical perspective. They should understand the "state of the art." And lastly, they should know what potential employers expect of them. In other words, we need to help them understand where they are coming from, where it's happening, and how to get there. To be as specific as possible I'll describe the situation within the biological disciplines I know best, environmental biology and ecology.

In the United States, ecology emerged as a biological discipline early in the 20th century (Burgess 1977). Following a latent period of approximately a quarter century, ecological research, ecological curricula, and ecologists have increased exponentially. Only recently research activity and traditional job opportunities have declined, as if conforming to a logistic growth curve (McIntosh 1980; Barrett et al. 1982). The Malthusian type relationship resulting from continued exponential increases in manpower and logistic increases in traditional jobs might lead one to conclude that unemployment is a serious problem. However, several sources of information reveal unemployment to be lower than expected. The supply of environmental biologists which exceeds traditional job opportunities has been absorbed by a variety of applied mission-oriented professions. It has been over a decade since ecology was predominately an academic profession (NAS 1977). Only half the membership of the Ecological Society of America (ESA) is employed in academia (Brown & McCormick 1981). As career opportunities become increasingly diverse and as competition for employment becomes increasingly intense, the need for career guidance and career preparation has increased significantly.

What reason is there to suspect we are not meeting this need? Nearly 60% of those surveyed in 1981 (Brown & McCormick 1981) reported career advising to be only average, poor, or non-existent. For some reason, significantly more women than men rated career advising as poor. These same respondents reported insufficient training in biostatistics, computer science, technical writing, and problem solving. Although their education in biology was quite sufficient, development of skills necessary to perform their work in applied biology was not satisfactory. Development of these supporting skills is a major part of career preparation. The

Education Committee of the ESA reported (Franz 1980) the most common deficiency in ecology curricula to be insufficient familiarity with applied ecology. My own experiences in resource management in developing countries convinces me there is no skill more valuable, or more useful in obtaining a job, than fluency in a foreign language.

A few years ago Gary Barrett and I (McCormick & Barrett 1979) advocated an educational process which, we believe, would better prepare students for jobs which really exist. We proposed that students have the equivalent of a double major; one being a traditional discipline within liberal arts, the other being an applied problem-solving discipline such as energy development, water resources, or resource management. One or a few interdisciplinary courses would serve as a capstone to this dualistic approach, integrating scientific concepts and problem-solving processes into a social-economic context. Students would have a liberal arts background with training in the scientific method, as well as an applied problem-solving background with supporting skills. At present, most biology students are educated via the liberal arts approach and most engineers and agricultural scientists are trained via the applied, problem-solving approach.

Individual faculty and departments are the only ones that can respond directly to the changing needs of students. Efforts are being initiated and guidelines are being developed to assist faculty in preparing students for productive careers. Historical reviews by McIntosh (1976, 1980), Burgess (1977), and others help to explain where we are coming from. Contemporary reviews of the "state of the art" in ecology by Johnson (1977), global developments in ecology by Kormondy & McCormick (1981), and applied ecology by Cooper (1982) and by The Institute of Ecology (TIE 1982) describe what's happening today. Previously quoted reviews and surveys of education, manpower, and employment opportunities reveal directions in which we are heading. The ESA and AIBS have sponsored national symposia on education and career opportunities.

The ESA is attempting to expand its role in public affairs. The more visible environmental biology becomes, and the better it is understood by the public, the easier it will become for young biologists to develop productive careers. Professional societies such as the ESA, or AIBS, can provide a valuable service to their membership by making the science more visible and by making more apparent the relevance of environmental biology to national and global issues. The ESA took a major step in this direction by giving birth to TIE in 1971. A recent further step has been to staff an ESA office in Washington, D.C. to monitor government programs and to increase awareness of the relevance of ecological principles.

Three recent accomplishments are of particular significance. First was the development of the Cooperative Ecological Intern Program. TIE manages this program for the U.S. Fish & Wildlife Service (U.S.F.W.S.). M.S. or Ph.D.-level ecologists are placed in one year intern positions in natural resource management. Work experience enhances the qualifications of interns and provides an opportunity for them to consider applied ecology as a career. Next was the implementation of the Ecology Series, GS-408 by the Civil Service Commission in 1978 (Fed. Reg. 1978). Finally, the federal government can employ ecologists, as ecologists. Most recently was the implementation of professional certification by the ESA. Qualification standards of the Civil Service and ESA programs are nearly identical. Both provide guidelines against which qualifications can be evaluated. Both define what is required to be an ecologist. Without these programs and

associated qualification standards, environmental biologists could not compete with other scientists and engineers for positions in environmental biology. One experience serves as a particularly frustrating example. While working for the Department of the Interior, I assisted in writing regulations governing P.L. 95-87, the Surface Mining and Reclamation Act. Requirements for "ecological assessments" created potential jobs for several thousand ecologists. However, it was decided by the solicitor's office that ecologists were not qualified to conduct ecological assessments. At that time there were no qualification standards within the Civil Service and there was no program of certification upon which to depend. As a consequence, regulations require certified engineers and other non-ecologists to conduct ecological assessments.

In summary, as the need for career guidance and preparation intensifies, it remains the weakest or missing link in biological education. By focusing upon environmental biology I described historical and contemporary factors which have influenced career opportunities and expectations of employers. And lastly, I identified selected efforts and programs which can assist faculty to provide students an effective link between knowing biology and doing biology. For the most part, this audience is already aware of the importance of career guidance and preparation. My objective has been to inform you that our efforts are inadequate, and to provoke you to respond. Every student should have an Alvin Beatty to depend upon.

The other weak or missing link is that which ties ecological science to the application of the science. Like an explosion, Environment suddenly became a major national issue early in the 1960's. Environment competed with civil rights for headlines, funding, and legislation for almost two decades. Ecology began to mature as a science during a period when research funds were relatively plentiful and when new technologies made it possible to acquire and process information at unprecedented rates. Improved analytical methods, application of systems theory, and rigorous mathematical tests of theoretical relationships have accelerated the development of concepts and have expanded our overall understanding of ecological relationships.

By the late 1960's, state and federal decision makers were forced to turn to ecologists for advice. We were being asked to apply our science even as the science was evolving. Under such conditions, even the most cautious were prone to make mistakes. For the most part, our response was STOP, do not proceed with economic development until we can provide safe and certain answers. With notable exceptions, such as selected projects of national laboratories and the Office of Biological Services of the U.S.F.W.S., there has been a serious delay in the transfer of scientific information from producers to potential users.

At the 1982 annual meeting of the ESA, Art Cooper presented the past-president's address entitled, "Why doesn't anyone listen to ecologists—and what can we do about it?" I recommend that you read his analysis in the December, 1982 issue of the *Bulletin of the ESA*. My own abbreviated analysis is that when the most important audiences were most willing to listen, we had little to say; we said it rather poorly; we frustrated audiences with disclaimers and uncertainties; and we were too often misidentified as environmentalists. Ecology and environmental biology have much to contribute, but we talk mostly to ourselves. Instead, we should be trying harder than ever to provide decision makers a scientific framework for environmental assessment and resource management. The task is dif-

ficult. Responsibilities for these two functions are scattered throughout government. Ecologists talk *to* government rather than as a *part of* government.

Environmental assessment is primarily the responsibility of the Environmental Protection Agency. Regulatory reform programs of the current administration initially appeared to offer opportunities to evaluate the scientific validity of environmental regulations, to conduct research necessary to answer uncertainties, and to reject regulations based upon false premises. However, regulatory reform has moved in directions other than applied ecology. Those who advocated a scientific framework for regulatory reform have moved out of government.

Assistant Secretary of the Interior Robert Herbst (1979) may have stated more clearly than others the major problem confronting resource management, "Our management system does not fit the systems to be managed." Interactions and interdependences between various components of ecosystems are well documented. These interconnections influence fundamental ecosystem properties, including productivity and stability. Knowing this, it is illogical to attempt to manage forests, water, soil, or wildlife independently of one another and through independent departments such as agriculture, interior, and defense.

During the mid to late 1970's the administration considered establishing an ecological service agency (U.S.E.S.), similar to the U.S. Geological Service, in order to improve the application of ecological science to resource management and environmental assessment. Above all else, this was an attempt to integrate resource management. Many of the nations' most respected ecologists had advocated precisely this action (CEQ 1974). The ESA responded positively, but with sufficient qualifications that the response was not accepted as an endorsement. The proposal died. A short time later, the ESA supported efforts of the White House Office of Science and Technology Policy to salvage part of the original plan. By that time a presidential election was forthcoming and the opportunity was forfeited. Since that election, even fewer administrators of environmental programs have been listening, some who are required to listen have been cited for contempt of Congress for not responding, and we have had only limited success with others.

Integrated planning and integrated resource management are two strategies proving effective in reversing this historical piecemeal approach to resource management. When environmental planning is included in initial stages of economic planning, rather than as an afterthought, the emphasis shifts from correcting impacts to avoiding them. Even though much of the necessary science and technology is developed in the U.S., developing countries have taken a lead in implementing integrated planning and management. Because they often have less infrastructure to dismantle, they can move more quickly in new directions. This is certainly true in East Africa where we are implementing economic development demonstration projects based upon integrated planning and integrated resource management. Our economic development plans are based on *supply side ecology* rather than *supply side economics*. In supply side economics the resource supply is manipulated by manipulating inputs and outputs. For example, lower taxes reduce the outflow of funds, leaving more for investment. Ecological concepts such as carrying capacity define the limits to which the natural resource base can be manipulated through various management practices. Concepts of *supply side ecology* set upper limits of exploitation, above which demand, not supply, must be manipulated.

Integrated resource management requires an integrated data base. This means inventories of all resources, all the links in the chain, must be equally complete, reliable and retrievable on equivalent scales of reference. Remote sensing offers developing nations a rapid and relatively inexpensive means of obtaining these resource inventories. In short order, remote sensing can provide resource information which previously required great expenditures of time, effort, and money.

An increasing number of economic development, environmental, and resource management issues are becoming global in scale. Specific regions of the U.S., such as the Tennessee Valley where I live and work, suffer from problems similar to those of developing countries. We have much to learn from one another. Our's is a knowledge based upon science and technology, their's is based upon vast experience and, in some cases, great appreciation of the land.

In summary, I have attempted to develop four points. First, career opportunities in ecology and environmental biology have become increasingly diverse and predominately applied in nature. Second, even as the need for ecological information and for applied ecologists has increased, we remain relatively ineffective in applying modern principles to contemporary problems. This has reduced the number of jobs available. Third, professional organizations and individuals are working to overcome these constraints, but, individual faculty and departments play the key role. Lastly, the major message for this audience is that students need better career guidance and a greater variety of supporting skills in order to compete for employment in environmental biology and ecology. Responsibility for this guidance is our's.

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**FORTY-FIFTH ANNUAL MEETING
MEMPHIS STATE UNIVERSITY,
MEMPHIS, TENNESSEE
APRIL 11-14, 1984**

PLAN NOW TO ATTEND!

1. See "Call-for-papers" for the various deadlines. Title and abstract due Nov. 1.
2. A **Pre-registration** form will be in the January issue. Pre-registration will be especially advantageous in obtaining tickets for special meals, eliminating the long lines at registration, as well as helping the Local Arrangements Committee with plans. Pre-registration will be at a much reduced price.
3. **Lodging.** The Ramada Hotel (Mt. Moriah) will serve as the guest hotel and a block of 100 rooms has been reserved with a special convention rate available for all rooms. There is a complimentary limousine service between the airport and the Ramada. It is located approximately five miles from campus. In addition, 50 rooms have been reserved at the Peabody, a fine old hotel located in downtown Memphis. Details of other area motels and their rates will be given in the January issue.
4. **Parking.** On-campus parking is limited, and a conference parking permit will be furnished with pre-registration and registration materials.

WANTED

Active ASB members who will:

- Send in nominations for officers
- Nominate outstanding teachers for the annual award
- Submit a paper for one of the research prizes
- Encourage their students and colleagues to join ASB
- Encourage their school library to subscribe to the ASB Bulletin
- Send in manuscripts and book reviews for publication in the Bulletin (see Vol. 30, p. 11 for details). Copy deadlines:

September 25—January issue

November 25—April issue

April 25—July issue

June 25—October issue

MERITORIOUS TEACHING AWARD 1984

CALL FOR NOMINATIONS

(Deadline: February 1)

Through the prestigious annual Meritorious Teaching Award, the ASB recognizes excellence in the teaching of biology by one of its members. The Teaching Award Committee asks that you begin to give consideration to nominations for the 1984 award. The Committee seeks new nominations as well as the renewal of nominations that are three years old or older. Please take a moment to consider a worthy candidate and make the nomination.

Nominees must be ASB members who are active or recently retired and who have taught biology in a southeastern institution for at least ten years. Among types of evidence of the qualifications of the candidate are the progress of the candidate as indicated by recognition at his or her institution (important assignments and other contributions specifically related to effective teaching) and the quality of students for whom the nominee has provided inspiration for advanced study and careers in biology.

Nominators should complete the nomination form in the call-for-papers or below and write a cover letter to accompany the form. Nominators are to seek *letters of support* for a candidate and submit a current *vita* for the nominee to the Committee. The *letters*, the *form*, and the *vita* are to be sent as soon as possible to:

Dr. Sandra T. Bowden
Department of Biology
Agnes Scott College
Decatur, GA 30030

NOMINATION—MERITORIOUS TEACHING AWARD 1984

NAME _____

ADDRESS _____

TEACHING INTERESTS _____

NAME OF NOMINATOR _____

ADDRESS _____

Book Reviews

Penn. Cordelia. 1982. **Landscaping with Native Plants.** John F. Blair, Publisher, 1406 Plaza Dr., Winston-Salem, NC 27103. \$14.95. 226 pp. illus., paperback.

This book is written specifically for the Piedmont and mountains from New England to Alabama. It includes hundreds of native trees, shrubs, vines, and herbs which are attractive, easily transplanted or obtainable from nurseries, already adapted to soil and climate, and useful for low-maintenance landscaping. The arrangement is by canopy and understory trees, shrubs and vines, herbs of woods and fields, landscaping for various areas, and maintenance including weed control and tips for beginners. The author, a landscape consultant in Greensboro, NC, stresses the importance of selecting plants to fit one's tastes, specific needs, and time and effort available for continued care. Checklists provide easy access to size, geographical range, habitat, flowering times, and general reasons for use. Her descriptions of the plants, with accurate scientific and vernacular names, include attributes and natural history which reflect her personal acquaintance with the plants in their native habitats. There are eight pages of color photographs plus about 45 line drawings by Dorothy S. Wilbur which aid in identification. Mrs. Penn also describes other aspects of the landscape (walks, terraces, driveways, fences, etc.) and gives sketches of some landscape designs, all with the same practical view of utility and low maintenance. This book is recommended for beginners, professional landscapers who will hopefully start using more native plants, and for professional biologists who spend more time in the laboratory and field than in their own yards. (Ed.)

Gibbons, J. Whitfield. 1983. **Their Blood Runs Cold. Adventures with Reptiles and Amphibians.** University of Alabama Press, University, AL 35486, 164 pp. illus., paperback (\$9.95) and hardcover (\$19.75).

This is one of those few books that will genuinely appeal to both scientists and non-scientists alike. It is a unique and cleverly blended combination of real-life adventures with reptiles and amphibians interspersed with factual statements of what we know about these interesting creatures. The style of introducing each chapter with an adventure story serves both to highlight a chosen message about each group of herptiles and to rivet the reader's attention for the descriptions and information on each group of organisms that follows.

Whit Gibbons has presented us with the herpetological equivalent to James Watson's *The Double Helix*. By mixing in adventure accounts, some of which are wildly humorous with side comments on life in general, the other side of science and scientists, especially herpetologists, is revealed. In the process, the failures, the successes, and the complexities of gathering scientific information are graphically depicted. And how they are depicted! The satirical and timely wit of Whit Gibbons makes this book difficult to lay down and some accounts are downright unforgettable. His style also imparts an endearing and understanding quality on the animals he describes and loves.

After an introductory chapter discussing the field of herpetology, each major group of reptiles and amphibians is treated to a chapter. There is also a chapter discussing the importance of collecting techniques and, in particular, finding the right technique. The final two chapters use herptiles as an illustration of our woeful lack of public education on ecological principles and environmental ethics. At the end of the book is a very useful list of selected references in herpetology. This list includes technical journals, state and regional field books, general texts, and specific regional accounts in various areas of the world. Throughout, the book gives us a good look at the Savannah River Ecology Laboratory and of the various habitats that these creatures call home.

A general theme pervades the book. It is that our knowledge of reptiles and amphibians and their ecological roles are so poorly known and understood. We have just scratched the surface of really understanding them, and it is indeed ironic that despite man's fascination with this group of creatures,

we know so little about them. Surely, we can do better. Indeed, as Whit Gibbons says, unraveling the mysteries of reptiles and amphibians are "*adventures into the unknown.*"

The contagious enthusiasm of Whit Gibbons and the love of his life's work comes easily through the written pages. Indeed, the book is a slice of Whit's personality. As such, it will appeal to a wide variety of audiences, ranging from real herpetologists themselves to amateurs and non-scientists who have just a little background but considerable interest and fascination in the world of amphibians and reptiles. (*Ken R. Marion, Department of Biology, University of Alabama in Birmingham, Birmingham, AL*)

Elias, Thomas S. and Peter H. Dykeman. 1982. Field Guide to North American Edible Wild Plants. Outdoor Life Books, Times Mirror Magazines, Inc., New York, NY 10017. \$22.95. 286 pp. color illus., hardcover.

Books on edible plants have become conspicuous and numerous since the prolific writings of Bradford Angier and Euell Gibbons. Some of these, particularly the one in The Peterson Field Guide Series, are excellent. This newest one is undoubtedly in the same category and obviously the most beautiful with over 350 color photographs. This is a season-by-season guide to the identification, harvest, and preparation of over 200 of the most popular and common, edible, wild, vascular plants of the U.S. and Canada. Some related edible species, as well as poisonous "look-alikes," are mentioned. General distribution maps are provided with the illustration of each plant, and they also form part of a rather unique "plant-seeking and identification system." This will be a very handy book to take on field trips and also to have in the office—the latter especially when someone calls or writes to find out all about a certain plant that their grandmother use to gather and cook for the family, or for that extra bit of natural history to help "jolly-up" that botany lecture (*Ed.*)

Bell, C. Ritchie and Bryan J. Taylor. 1982. Florida Wild Flowers and Roadside Plants. Laurel Hill Press, Chapel Hill, NC. \$19.00. 308 pp. illus., hardcover. (Order from: FWF Books, Box 2744, Winter Park, FL 32790; postage is included in the price.)

This is a beautifully illustrated, popular guide to the colorful native and naturalized vascular plants of Florida—from Pensacola to the Keys. There are over 500 full color photographs with excellent color reproduction. There is a very short description and note on habitat and distribution for each. There is also a glossary of terms and keys to the plants illustrated. This will undoubtedly be a popular wildflower guide for Florida and the southeastern Coastal Plain. (*Ed.*)

News of Biology in the Southeast

JON R. FORTMAN—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

Tuskegee Institute, Department of Biology. *Dr. Velma B. Richardson*, Assistant Professor of Biology, received the Henry B. Good Memorial Award in recognition of outstanding achievement in scholarship and research in the zoological sciences. Dr. Richardson received her Ph.D. from Auburn University and is currently involved in research of clastogenic effects of selected drugs. *Dr. Walter A. Hill*, Associate Professor of Biology, and *Pansy Bacon*, former graduate student in Agricultural Sciences, won the Plucknett Award for the Outstanding Paper presented at the 6th International Symposium on Tropical Root Crops in Lima, Peru.

Georgia

Agnes Scott College, Department of Biology. An extensive \$3,000,000 renovation of the John Bulow Campbell Science Hall was completed during the early part of 1983. The modern science building has many features in the new and redesigned laboratories, including animal care facilities, and radioisotope areas.

Columbus College, Department of Biology. After 25 years of service, *Professor Kenneth Nance* retired in December of 1982. In May 1983, the Board of Regents awarded him emeritus status. *Francis E. Gardner, Jr.*, Associate Professor of Biology, has been named the "Educator of the Year" for 1982–83. Dr. Gardner has been on the faculty for 9 years, and he was recognized for his excellence in teaching, professional leadership, and outstanding service. Responsible for instruction in general biology and physiology, Dr. Gardner has been a visible advocate of a liberal education and high academic standards. *William C. LeNoir, Jr.*, Professor of Botany, has been serving as Dean of the School of Science since July 1982. The new school was formed via a reorganization of the college last summer. Dr. LeNoir was formerly Chairman of the Division of Science and Mathematics, and served for a year as Acting President of Columbus College. *George E. Stanton*, Professor of Biology, has been appointed Chairman of the newly formed Department of Biology.

Mississippi

Mississippi University for Women, Division of Science and Mathematics. *Dr. William Parker* has been promoted to Professor of Biology with permanent tenure.

Gulf Coast Research Laboratory, Ocean Springs. *Dr. Edwin W. Cate, Jr.* has been appointed to the Gulf Islands National Seashore Advisory Commission by U.S. Secretary of the Interior James Watt. *Dr. Harold D. Howse*, director of the GCRL, announced that a formal teaching affiliation has been approved between the Laboratory and Rust College of Holly Springs, Mississippi. *J. Y. Christmas*, senior fisheries researcher, has accepted a reappointment to serve as a member of the Gulf of Mexico Fishery Management Council's Scientific and Statistical Committee.

Belhaven College, Biology Department. *Dr. Ann C. Dent* has been appointed Assistant Professor of Biology for the 1983–84 academic year. Dr. Dent received her Ph.D. from the Department of Physiology and Biophysics at the University of Mississippi School of Medicine.

Mississippi-Alabama Sea Grant Consortium, Ocean Springs. *Dr. Ralph E. Powe* of Mississippi

State University has been elected Chairman of the Consortium Board of Directors. Dr. Powe is Associate Vice President for Research at Mississippi State. Other officers are: *Dr. Gene A. Bramlett*, Vice Chairman, and *Dr. Harold D. Howse*, secretary.

North Carolina

The University of North Carolina at Chapel Hill, Department of Biology. *Dr. J. R. Massey*, Curator and Administrator of the Herbarium, replaced *Albert E. Radford* as Director on July 1, 1983. Dr. Radford continues to serve as Professor of Biology.

University of North Carolina, Institute of Marine Sciences. The fish, mollusk and crustacean collections were recently moved into a new 1463 sq. ft. building located a few feet from the main research building. *Dr. Frank J. Schwartz* represented North Carolina and served on several panels at the International Western Atlantic Turtle Symposium, San Jose, Costa Rica. He also presented a paper at the International Symposium on Tilapia in Agriculture, May 1983, in Nazareth, Israel.

North Carolina State University, Department of Horticultural Science. The following faculty were promoted to Associate Professor with permanent tenure: *Dr. Vincent P. Bonaminio*, nursery crop production; *Dr. Eric Young*, scion/rootstock and interstem effects on apple tree production. *Mr. Melvin Kolbe*, tree fruit extension, retired after 38 years of extension service, 28 at NCSU.

North Carolina State University, Department of Botany. *Dr. Rick A. Linthurst* has accepted a position as Director of Ecological Services, Kilkelly Environmental Associates, Inc., Raleigh, NC.

South Carolina

Clemson University, Department of Biological Sciences. The former departments of Biochemistry, Botany, and Zoology have been merged into a new Department of Biological Sciences. The head of this department is *Dr. Carl Helms*. The address is Long Hall, Clemson University, Clemson, SC 29631.

Tennessee

The University of Tennessee, Knoxville, Botany Department. *Dr. Hazel R. Delcourt*, Research Assistant Professor, will be working on a two year NSF project entitled, "Late-Quaternary Vegetational History of the Southern Appalachian Mountain Region." *Dr. Paul A. Delcourt*, Department of Geological Sciences, and *Dr. J. Dan Pittillo*, Department of Biology, Western Carolina University, are collaborators on this project.

Memphis State University, Department of Biology. *Dr. Glen Peterson*, Professor of Biology, and *Dr. John Smith*, Professor of Civil Engineering, are co-investigators on three projects involving biodegradation of toxic chemicals, bio-degradation of organic surfactants, and biological detoxification of hazardous wastes. Memphis State recently hosted a three day symposium on Human and Environmental Toxicology, which concentrated on problems involving pesticides and industrial chemicals. People from industry, academics, and government were in attendance. The key note address was delivered by *Dr. Rolf Hartung* from the University of Michigan. *Dr. Stephen J. Klaine* coordinated the symposium.

Vanderbilt University, Department of General Biology. *Professor William G. Eickmeier* has been promoted to the position of Associate Professor of Biology. *Susan H. Brawley* (Ph.D. University of California, Berkeley) has joined the faculty. Dr. Brawley was Research Associate in the Physiology Department of the University of Connecticut Health Center, Farmington, CT. Her research interest is in the area of plant developmental physiology. *Dr. B. J. Bogitsh* has returned from Egypt where he was a senior Fulbright Lecturer.

Virginia

Lynchburg College, Biology Department. *Dr. Gwynn W. Ramsey*, Professor of Biology and Curator of the Herbarium, has been appointed Chairman of the Department. Dr. Ramsey is a botanist with long-time research interests in the taxonomy and biosystematics of *Cimicifuga* (Ranunculaceae), and the Vascular Flora of Virginia. Dr. Ramsey received his Ph.D. at the University of Tennessee, and has been on the faculty for 18 years.

West Virginia

Marshall University, Department of Biological Sciences. The 44th Annual ASB meeting in Lafayette, Louisiana was attended by 12 faculty and students with papers being presented by *Donald Tarter* and *James Joy*.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

The Marie Selby Botanical Gardens, Sarasota. The 30-year hobby of a Sarasota orchidologist is now delighting visitors to the Botanical Gardens. The new array of multi-flowered orchids in the Tropical Display House is part of the private collection of the recent late H. Bregy Van Cleve that has been donated to the Gardens by his widow Claudia. The Charitable Trust of the American Hibiscus Society has underwritten a 14-week internship and presented Selby Gardens, in advance of selecting the student, with a check for \$1500. The Gardens' work-study program is designed to train graduate and undergraduate students in the practical aspects of the operation of a botanical garden with a certain number of hours devoted weekly to areas of particular interest to the intern. The only *Polycycnis surinamensis* ever known to bloom in the United States resides at Selby Gardens. This extraordinary orchid is very difficult to grow outside its native Suriname (former Dutch Guiana), let alone persuade it to bloom. It's finder and guardian is *Ron Determann*, a resident intern and student at Bradenton's Manatee Junior College. The orchid was found in July 1981 during an expedition to the Wilhelmina Mountains deep in Suriname's interior. Mr. Determann spotted the orchid in full bloom at eye level on a mossy tree limb.

Kentucky

Western Kentucky University—The Kentucky Museum. The Felts family log house, built by Archibald Felts circa 1810–20, is scheduled to be open for tours on the weekends beginning in September. Constructed in poplar, oak, and walnut, the house provides a classic example of "V"-notched, dog trot construction. The house remained in the Felts family and was virtually unchanged from 1820 to 1980, when it was moved to the Kentucky Museum. The house will eventually be furnished with reproduction period furniture, to demonstrate lifestyles of Kentucky in the 1830's. Another exhibit is "The Bride Wore Blue," which depicts 19th century and early 20th century wedding dresses. This exhibit will open October 11, 1983. A series of workshops designed to help Kentucky teachers take advantage of local resources—diaries, folklore, photographs, maps, gravestones, buildings—is being held at the Museum this Fall. The topics include the Shakers, family history, and a Victorian Christmas.

Mississippi

Mississippi Museum of Natural Science, Jackson. The museum has received a Gold Award (1st place) from the Greater Jackson Advertising Club for Excellence in Advertising. The award was for a poster and matching invitation prepared for the 1982 Open House and Special Reopening Events. Exhibit schedules for the rest of the year include "Snakes" (July 7–August 12), "Dragonflies" (August 17–Sept. 24), "Gems and Minerals" (Sept. 28–Nov. 1), "Fish" (Nov. 4–Dec. 3), and "Christmas at MMNS" (Dec. 7–27).

North Carolina

Discovery Place—Science Museums of Charlotte, Inc. New temporary exhibits for October and November 1983 are "Our Radioactive World" (An American Nuclear Society exhibit) and "North Carolina Gemfest Expo." New permanent exhibits are Vistaseope Wide Screen Theatre System and the film "To Fly," which starts July 14, 1983, and Laser pinball premiere, beginning in September 1983.

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. J. Charles O'Kelley, Biology Dept., Univ. of Alabama, University, AL 35486.

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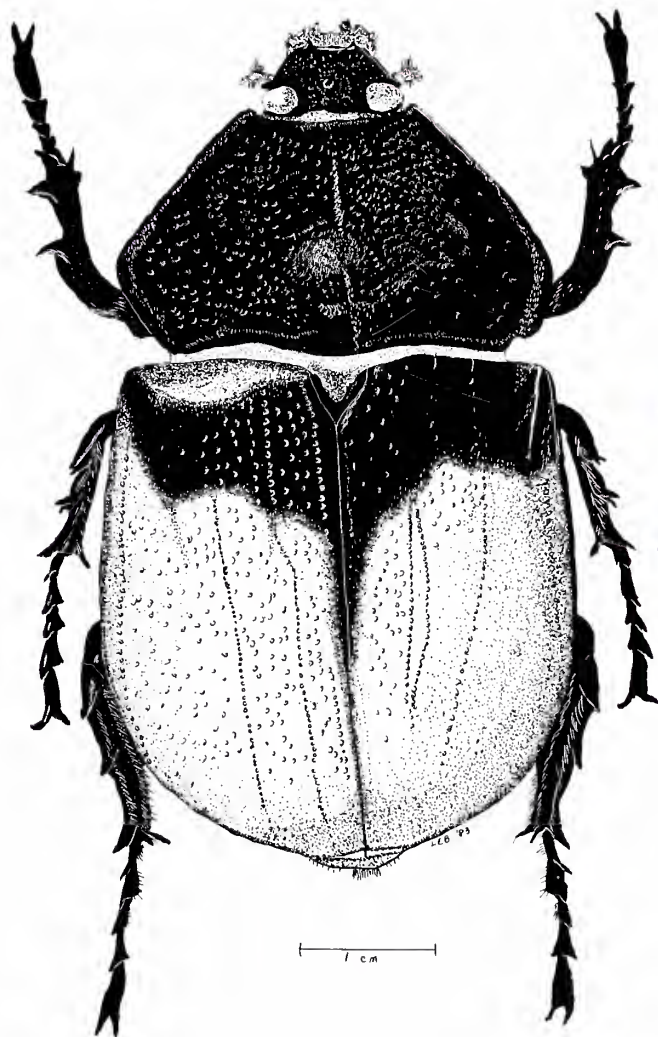
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The ASB

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Volume 31, Number 1

January 1984



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Scientific Illustrations

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COVER

Beetle drawn by Lynn Broaddus in a class in “*Techniques and Materials for Scientific Illustration*” taught in 1983 at Mountain Lake Biological Station by Mrs. Esta L. Johnston, Contract Illustrator to George Mason University. Courtesy of Miss Broaddus, Foxcroft School, Middleburg, VA.

TIME AND PLACE OF FUTURE MEETINGS

1984	April 11–14	Memphis State University
1985	April 10–13	Middle Tennessee State University, Murfreesboro
1987		University of Georgia, Athens (50th Anniversary)

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Parco Scientific Company, Vienna, OH
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Botany at Mountain Lake Biological Station: A Brief History

James W. Hardin

*Department of Botany, N.C. State University,
Raleigh, North Carolina 27650*

Abstract

Mountain Lake Biological Station is located in the mountains of southwestern Virginia and is a branch of the University of Virginia. Since its establishment in 1929 and first classes in 1930, it has had an impressive history of summer botany courses taught by an equally impressive faculty invited from different institutions. The early course offerings, prior to 1960, included plant anatomy, cytology, physiology, and bacteriology. Since the early 1960's, the courses have been entirely "field oriented" and have maintained a balance between the more classical and basic topics such as taxonomy and ecology, and the newer specialties such as population biology. The diversity of faculty, courses, students, and researchers leads to a stimulating atmosphere conducive to intensive study, research, and camaraderie.

The Mountain Lake Biological Station is located in the Ridge and Valley Province of southwestern Virginia (Giles County) at an elevation of 3840 feet on Salt Pond Mountain. It is a branch of the University of Virginia and was established in 1929 as an inland field station for research and advanced training in field biology (botany and zoology).

The setting is ideal for botany courses and research. Mountain ridges and peaks nearby go to over 4000 feet and the New River valley below is around 1500 feet. Coupled with this altitudinal gradient of over 2500 feet is a diversity of bedrocks including sandstones, shales, and limestones. The forest is of mixed hardwoods/pine/hemlock/and spruce; in the "oak-chestnut" forest region sensu E. Lucy Braun (1950). Many rich and diversified habitats support a vascular flora of about 1050 species plus an equally rich algal, fungal, and bryophyte flora. This floristic diversity provides excellent opportunities for studies in aquatic and terrestrial field biology.

Each summer, in two 5-week terms, a variety of small classes are taught by faculty members invited from different institutions. The diversity of faculty, courses, students, and researchers leads to a stimulating atmosphere conducive to intense study, research, and camaraderie. A brief summary of the botanical courses taught over these 53 years (Table 1) shows a remarkable and impressive history of botany at Mountain Lake—with a blend of the traditional with the most current topics and taught by a faculty which has included many of the leading botanists of the eastern United States. Many faculty members have returned to teach several summers which is a good indicator of the fine facilities and enjoyable teaching experiences. Ten faculty members have taught for two summers, thirteen for three to five summers, three for six to eight summers, and two for ten or more. Professor Paul M. Patterson, Hollins College 1934–67, taught bryology, algology, or morphology ten summers over a period of nineteen years. Professor Ivey F. Lewis, University of Virginia and Director of the Station 1934–46, taught cytology, anatomy, or morphology fourteen times from 1931 to 1946.

Only three courses were taught for the first three years—Plant Cytology, Plant

TABLE 1. SUMMARY OF BOTANICAL COURSES TAUGHT AT MOUNTAIN LAKE, 1930--1983.

	Cytochemistry-Histochemistry	Plant Morphogenesis	Biological Materials	Plant Physiology	Cytogenetics	Plant Cytology	Plant Anatomy	Microbiology/Bacteriology	Plant Morphology	Morph. of Archegoniates	Morph. of Tracheophytes	Morph. of Seed Plants	Plant Geography	Taxonomy and Ecology	Taxonomy (Vascular plants/Seed plants)	Mycology	Phycology	Bryology	Pteridology	Lichenology	Plant Habitats / Plant Ecology	Aquatic Biology / Limnology / Aquatic Ecology	Dendrology	Field Botany	Ecological Genetics	Plant Biosystematics	Paleobotany	Parasitic Angiosperms	Reproductive Biology of Plants	Evolutionary Ecology	Population Biology
1980																															
1970																															
1960																															
1950																															
1940																															
1930																															

Morphology, and Taxonomy and Ecology. From 1933 on there has been a steady proliferation of courses reflecting the expertise of the various instructors, the interests of the directors, and the origin and expansion of botanical disciplines. The courses listed in the left half of the Table, those generally considered “laboratory” rather than “field” oriented, were taught until the early 1960’s. Cytology was offered by Ivey F. Lewis (U. Va.), Conway Zirkle (U. Penn.), and L. R. Cleveland (Harvard U.). Plant Anatomy was taught by Ivey Lewis, Hiden Cox (V.P.I.), David Bierhorst (then at U. Va.), Carl Wilson (Dartmouth C.), and others. Microbiology or Bacteriology was taught regularly over a period of 15 years and Plant Physiology over 12 years, both by a variety of faculty members from eastern schools. Plant Geography was taught in 1947 by John Henry Davis (U. Fla.).

A course in Biological Materials, designed for high school teachers, emphasized techniques in collecting, preserving, and exhibiting specimens and the teaching of evolution. It was taught first in 1943 by Dr. Hugo Iltis who was at that time Professor of Biology at Mary Washington College, and who was the biographer of Gregor Mendel (*Life of Mendel*, 1932). (His son, Hugh Iltis, returned in 1958 and taught Plant Taxonomy.) This course in Biological Materials was taught again in 1944 by Dr. Paul R. Burch (Radford State Teachers College, now Radford College). Some of the important information is taught now in various courses in taxonomy of specific groups.

The early general course in Plant Morphology was soon segregated into Morphology of Seed Plants, Archegoniates, and Tracheophytes and taught by Ivey Lewis, Hugo L. Blomquist (Duke U.), and P. D. Strausbaugh (W. Va. U.). The emphasis then shifted more toward courses in taxonomy which combined morphology, phylogeny, classification, and identification of specific groups of plants and led to such courses as Taxonomy of Seed Plants, Pteridology, Bryology, Phycology, Mycology, and Lichenology. Of these, Mycology has had the longest history at Mountain Lake, having been taught first in 1933 by John Couch (U.N.C.-Chapel Hill) and later by others such as Charles M. Wilson (McGill U.) and C. J. Alexopoulos (U. Texas). Phycology (or Algology) was taught in 1935 and 1940, then not again until given by Gerald Prescott (Mich. State U.) in 1957, 1960, and 1964. A class in Pteridology was begun in 1962 by W. H. Wagner, Jr. (U. Mich.) and continued by him or his former students (A. Murray Evans, U. Tenn.; Donald R. Farrar, Iowa State U.). The Mountain Lake area is particularly rich in pteridophytes and pteridophyte problems as indicated by Wagner (1963 & 1966).

Plant Taxonomy has varied in scope (vascular plants, seed plants, or dendrology) depending on who taught it. H. R. Totten (U.N.C.-Chapel Hill) first taught Dendrology in 1936, then Taxonomy (of vascular plants) was given by John M. Fogg, Jr. (U. Penn.) in 1937, 1938, and 1940. This has since been taught, more frequently and consistently than any other course, and by a variety of taxonomists such as Ruskin Freer (Lynchburg C.), A. B. Massey (V.P.I.), Royal Shanks (U. Tenn.), Robert F. Thorne (then at State U. Iowa), Hugh Iltis (U. Wisc.), Robert Kral (then at V.P.I.), J. W. Hardin (N. C. State U.), Carl S. Keener (Penn. State U.), A. Murray Evans (U. Tenn.), W. H. Wagner, Jr. (U. Mich.), and others more recently. This course has benefited greatly by the maintenance of a small vascular plant herbarium of collections made by students and teachers through the years plus the check lists of the area prepared by Thorne and Cooperrider (1960, 1964).

A relatively recent course entitled "Field Biology of Green Plants," "Field Biology of Southern Appalachian Plants," or "Field Botany of the Southern Appalachians" was earlier taught by C. Ritchie Bell (U.N.C.-Chapel Hill) in 1977 and 1979, and A. J. Sharp (U. Tenn.) in 1980. This is basically a taxonomy course but with more of a "natural history" approach.

Bryology, or earlier included under Archegoniates, has been taught by Paul M. Patterson (Hollins C.) and Rudolf M. Schuster (U. Mass.) until 1963 then more recently by others. Lichenology was taught by W. L. Culberson (Duke U.) in 1963.

Plant Ecology was originally combined with taxonomy and taught by A. B. Massey (V.P.I.) and Paul A. Warren (Wm. & Mary). It achieved separate status as "Plant Habitats" in 1934 and continued under this title until 1941 when it was called "Plant Ecology." Notable among the professors have been B. W. Wells

(N. C. State), Stanely A. Cain (then at U. Tenn.), Royal E. Shanks (U. Tenn.), Carl D. Monk (U. Fla.), Maurice Brooks (W. Va. U.), J. Frank McCormick (then at U.N.C.-Chapel Hill), and William E. Odum (U. Va.). Like the course in taxonomy, ecology has been taught frequently and the scope and emphasis has varied according to instructor.

The upward slope seen in the right third of the Table is due to more recent courses reflecting the emergence of new fields and techniques. Aquatic Biology (or variously called Hydrobiology, Limnology, or Aquatic Ecology) started in 1950 and was initially botanical, certainly as taught by Larry A. Whitford (N. C. State U.) in 1952, but has since become separate from Phycology and more specifically a course in aquatic ecology. Paleobotany, initially combined with morphology, was taught in 1955 by David W. Bierhorst (then at U. Va.) and more recently, as a separate course, by Judith E. Skog (George Mason U.). Parasitic Angiosperms, taught in 1979 by Lytton J. Musselman (Old Dominion U.) reflects the relatively recent interest in and knowledge of the holo- and hemi-parasites of the eastern United States (Riopel, Musselman, and Lynn, 1982).

Courses such as ecological Genetics (taught primarily by David A. West, V.P.I.), Plant Biosystematics and Reproductive Biology (both by C. Ritchie Bell, U.N.C.-Chapel Hill), Evolutionary Ecology (by Milton E. Lieberman, U. Va. or Joseph Travis, Fla. State U.), and Population Biology (by Janis Antonovics, Duke U. and Leslie Real, N. C. State U.) are an indication of the direction modern field biology is taking, with more computer-assisted quantitative techniques, interactions of animals and plants (*i.e.*, pollination ecology, zoochory, and predation), and a greater concern for population dynamics and evolutionary strategies.

The significant picture of botany at Mountain Lake that emerges from this brief history is an ideal diversity and balance of course offerings including the more classical and basic topics as well as the newer specialties. All are "organism oriented," very relevant, and necessary for the broad training of botany students of today. All are very exciting. All are ideal for this inland biological field station.

For additional information, write: Director, Mountain Lake Biological Station, Dept. of Biology, Univ. of Virginia, Charlottesville, VA 22901.

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About the Memphis Meeting

Memphis State University will host the 45th Annual Meeting of the Association of Southeastern Biologists on April 11–14, 1984. Registration, paper sessions, exhibits, placement services, and the general session will be in the University Center Ballroom. A Mississippi River cruise with dinner is featured on Thursday evening, and the Hospitality Room of the Schlitz Belle will be the banquet site on Friday evening.

Memphis State University and the Department of Biology invite all ASB members and other interested biologists to participate. We urge attendees to *pre-register* by using the pre-registration form provided in this issue. Pre-registration saves money, insures tickets to all events, and is of considerable help to the Local Arrangements Committee.

SOCIETIES MEETING WITH ASB IN MEMPHIS

American Society of Ichthyologists and Herpetologists, Southeastern Division
Beta Beta Beta, Southeastern Region
Botanical Society of America, Southeastern Section
Ecological Society of America, Southeastern Chapter
Southeastern Society of Parasitologists
Southern Appalachian Botanical Club

MEMPHIS AND MEMPHIS STATE UNIVERSITY

Memphis is a unique city serving the entire nation as a natural waterway and a hub for rail and airways. Committed to the arts and sciences and chosen four times as winner of the Nation's Cleanest City Award, Memphis is a place of pleasant living for a million people of varied creeds and nationalities. Memphis is the largest city in Tennessee and home of numerous attractions including world-famous Cotton Row, Beale Street, Mud Island, Victorian Village, and Brooks Art Gallery.

Memphis State University is in a residential setting in the eastern portion of the city and serves a student population of over 20,000. The University consists of the Graduate School, the C. C. Humphreys School of Law, the University College (undergraduate only), and five colleges offering graduate and undergraduate programs. Accreditation of programs is 100%. The libraries contain over 900,000 bound volumes and some 1,750,000 pieces of micromaterial. Among the numerous centers and institutes on campus are the Center for Electron Microscopy, the Tennessee Earthquake Information Center, the Speech and Hearing Center, and the Center for Nuclear Studies.

The Department of Biology has 33 full-time faculty and several adjunct professors. Funding support for research comes from a variety of external sources including the USDA, NSF, and NIH. The Department offers the Master of Science

and Doctor of Philosophy degrees with a major in Biology and concentrations in Botany, Cell Biology, Invertebrate Zoology, Microbiology, and Vertebrate Zoology. Facilities are housed in Ellington Hall and Life Sciences on the main campus. The Athey Herbarium and Brooks Museum are housed in Ellington Hall. The Ecological Research Center is on the South Campus and houses facilities and space for a variety of research projects. The Meeman Biological Field Station is situated on 636 acres of land near the Mississippi River, some 14 miles north of the main campus.

PRE-REGISTRATION AND REGISTRATION

A PRE-REGISTRATION form is provided with this copy of the bulletin. Pre-registration will better enable us to provide services and facilities that you expect at the ASB Annual Meeting. Pre-registration packets and late registration will be in the lobby of the Ramada Hotel (Mt. Moriah and I-240) on Wednesday from 5–9 P.M. and on Thursday 8 A.M.–5 P.M. in the lobby of the third floor of the University Center, Memphis State University. Please note that PRE-REGISTRATION costs less and at registration, a limited number of tickets will be available for breakfasts, luncheons, the banquet, and field trips. Tickets are needed for all breakfasts, luncheons, banquets or field trips. Use the pre-registration form for requests.

TRAVEL TO MEMPHIS AND MEMPHIS STATE UNIVERSITY

Automobile—Memphis is located on Interstate 40 (east-west) and Interstate 55 (north-south). *The meeting headquarters is the Ramada Hotel at 2490 Mt. Moriah at I-240.* Consult the map to be published in the April, 1984, ASB Bulletin for major thoroughfares from motels/hotel accommodations to Memphis State University campus. *Shuttle busses will run between the Ramada Hotel and MSU in the A.M. and P.M. peak movement hours.*

Air Service—Memphis International Airport is located approximately six miles from the MSU campus. Many of the major motels/hotels have complimentary limousine service from the airport to the hotels. Shuttle service from the airport will be provided by Memphis State *if requested. Please contact:* Dr. Charles Biggers, Department of Biology, Memphis State University, Memphis, Tennessee 38152 (phone: 901/454-2970). Memphis is served by Delta, Republic, American, U.S. Air, Piedmont, United, Frontier, as well as seven commuter lines. Car rentals and taxi service are readily available at the airport.

Bus Service—Memphis is served by Greyhound and Trailways Bus Lines. The terminals are located downtown at 203 and 235 Union Ave. The University is located about 8 miles east of the downtown area.

AMTRAK—Service is limited to north-south routes from New Orleans to Chicago daily.

ACCOMMODATIONS

Memphis State University will not have conference housing available for this meeting; however, there are numerous hotels/motels in the city with a wide range of prices for occupancy. The University has made arrangements with three large motels to hold blocks of rooms at "special rates" for *ASB participants* until one month prior to the April 11-14, 1984 meeting dates. *Reservations should be made directly with these facilities and those reserving space should be sure to indicate they are ASB participants to receive special rates.* The refurbished Peabody Hotel, one of the South's grand hotels, has offered its elegant facilities at a considerably reduced rate. For those desiring the best Memphis has to offer—this would be a satisfying experience.

Additionally, there are numerous national motel chains that are listed with location and telephone numbers for reservations.

Hotels and motels where rooms are reserved:

		Distance from Memphis State
— Ramada Hotel (<i>Meeting Headquarters</i>)	100 Rooms	4 miles
2490 Mt. Moriah Rd. at I-240	1-4 persons—\$43.00	
(901) 362-8010		
Limousine service from airport		
— Holiday Inn	75 Rooms	5 miles
5679 Poplar Avenue (Poplar/I-240)	1-4 persons—\$54.00	
(901) 682-7881		
— Quality Inn East	70 Rooms	5 miles
5877 Poplar Avenue (Poplar/I-240)	1-4 persons—\$45.50	
(901) 767-6300		
Limousine service from airport		
— Peabody Hotel	50 Rooms	7 miles
149 Union Avenue (Downtown)	Rooms available from	
(901) 529-4000	Single/Double—\$60.00-\$105.00	
	\$15.00 for each additional person	

Other hotels/motels—contact for room prices:

	Distance from Memphis State
— Days Inn	7 miles
5301 Summer Avenue (901) 761-1600	
I-55 and Brooks Road (901) 345-2470	8 miles
— Red Roof Inn	
I-40 at Sycamore and Bartlett Road (Exit 12)	7 miles
1-800-848-7878	
— Welcome Inn	
I-40 (Exit 12)	7 miles
(901) 388-1300	
— Hyatt Regency Hotel	
I-240 and Poplar Exit	6 miles
(901) 761-1234	

—**Hilton Inn-Memphis Airport**

2240 Democrat Road
(901) 332-1130

6 miles

—**Holiday Inn-Holiday City**

3728 Lamar Avenue
(901) 363-1300

7 miles

Limousine service from airport

CAMPING FACILITIES

KOA Campground—East Memphis—3300 Canada Road (901) 388-3053. Exit 20 off I-40, approximately one-half mile from Interstate. Cost: \$10.75 for two people per night; electricity only. \$11.50 per night for two people; full hook-up. \$2.00 per night for each additional person.

Welcome Inn—1541 Sycamore View Road (901) 388-1300. Exit 12 off I-40 at Sycamore View Road. Cost: \$12.81 per night, complete hook-up. Twenty spaces.

GENERAL SCHEDULE

Wednesday

Registration: 5:00–9:00 P.M., Ramada Hotel.

Social Mixer with cash bar: 6:00–11:00 P.M., Ramada Hotel.

Executive Committee meeting: 7:00 P.M., Ramada Hotel.

Thursday

Registration: 8:00 A.M.–5:00 P.M., University Center.

Past-President's Breakfast: 8:00 A.M.

Paper sessions, placement service: University Center.

City Tour for Guests and Members: Morning.

General Plenary Session: 11:15 A.M.–12:30 P.M., University Center.

Exhibits: Faulkner Lounge, University Center.

Business meetings and luncheons of Southeastern Society of Parasitologists and
Southeastern Chapter of the Ecological Society of America: University Center.

Mississippi River Excursion on *Memphis Showboat*: 6:00–11:00 P.M., see Pre-registration form.

Friday

Society and group breakfasts, business meetings: 7:00–9:00 A.M., University Center.

Paper sessions, placement service: University Center.

ASB Business Meeting: 11:15 A.M.–12:15 P.M., University Center.

Exhibits: University Center.

Business meetings and luncheons of various societies: University Center.

Social Hour: 6:00–7:30 P.M., Schlitz Belle.

ASB Banquet: 7:30 P.M., Schlitz Belle.

Saturday

Executive Committee Meeting: 8:00 A.M., Ramada Hotel.

Field Trips: Begin at 8:00 A.M. and 9:00 A.M. Departure from parking lot of Ramada Hotel.

POINTS OF INTEREST IN THE MEMPHIS AREA

Memphis Zoological Garden and Aquarium—An impressive exhibition of more than 2000 exotic and familiar animals, located in Overton Park. Open 9 A.M.–5 P.M. daily. (901) 726-4775.

Memphis Botanical Garden—The Goldsmith Civic Garden Center, located at 760 Cherry Road in Audubon Park, contains lavish exhibits of flora including many plants not native to Memphis. The arboretum features rose and iris gardens, magnolias, wild flowers, and a stand of oaks. Outdoor gardens open from sun up to sun down. Building which houses a library and greenhouse open 9 A.M.–5 P.M., Monday through Friday: 1–5 P.M., Saturday and Sunday. (901) 685-1566.

Lichterman Nature Center—A 65-acre wildlife sanctuary and public environmental education facility located at 5992 Quince Road. Includes excellent examples of forest, field, pond, and marsh habitats, offering visitors a unique opportunity to enjoy native plants and wildlife in their natural setting. Open 9:30 A.M.–5 P.M., Tuesday through Saturday: 1–5 P.M., Sunday. (901) 767-7322.

Meeman-Shelby Forest State Park—located 12 miles north of Memphis. Camping, hiking, boating, fishing, horseback riding, picnic areas. (901) 876-5201.

Chucalissa Indian Museum—An archaeological development and village reconstruction, serving as an off-campus facility of the Department of Anthropology, Memphis State University. Adjoins T. O. Fuller State Park on Indian Drive, reached by Mitchell Road West. Open 9 A.M.–5 P.M., Tuesday through Saturday: 1–5 P.M., Sunday. (901) 785-3160.

Dixon Gallery and Gardens—Located at 4339 Park Avenue, a collection of French and American Impressionist art, including 18th and 19th century British portraits and landscape paintings. The Gallery is surrounded by 17 acres of formal gardens reminiscent of the great English landscape parks. Open 11 A.M.–5 P.M., Tuesday through Saturday: 1–5 P.M., Sunday. (901) 761-5250.

Memphis Pink Palace Museum—A regional, natural, and cultural history museum plus a planetarium with a 50-foot dome. Located at 3050 Central Avenue. Museum open 9:30 A.M.–4 P.M., Tuesday through Friday; 9 A.M.–4 P.M., Saturday: 1–5 P.M., Sunday. (901) 454-5600.

Memphis Brooks Museum of Art—Located in Overton Park. Features outstanding permanent collections of paintings and sculpture, plus frequent loan exhibits. Open 10 A.M.–5 P.M., Tuesday through Saturday: 1–5 P.M., Sunday. (901) 726-5266.

Memphis Academy of Arts—Located in Overton Park (adjacent to Brooks Museum of Art). Student and professional works of art on display in main hall of academy. Open 9 A.M.–5 P.M., Monday through Friday. (901) 726-4085.

Mud Island—Located just offshore from downtown Memphis, this 50-acre entertainment and education center serves as a tribute to the history and heritage of the Mississippi River. Includes the Mississippi River Museum containing hundreds of river-related exhibits, the River Walk, a five block long scale model of the river, picnic areas, restaurants, and gift shops. Open 10 A.M.–Midnight, daily. (901) 528–3595.

Victorian Village—A group of preserved or restored 19th-Century homes near downtown with architecture ranging from Neo-Classical through Late Gothic Revival.

The Peabody Hotel—Listed on the National Register of Historic Places, this downtown landmark first opened in 1869 and was rebuilt on the current site (149 Union Avenue) in 1925. The Peabody serves as a standard for excellence in hospitality.

Beale Street—This world famous downtown landmark, often called the Home of the Blues, features W. C. Handy Park at the corner of Beale and Third Street, honoring W. C. Handy—the Father of the Blues.

National Ornamental Metal Museum—Located on the Mississippi River at 374 West California. Features architectural metal work and decorative arts. Open Noon–5 P.M., Tuesday through Sunday. (901) 774–6380.

Museum of Natural History—Located in The Ellington Biology Building on the Memphis State campus. A small but impressive collection still in the developmental stages. On display are African and North American mammals and birds from various parts of the world. (901) 454–2596.

University Gallery—Located in the Communication and Fine Arts Building on the Memphis State University campus. Features changing exhibits in addition to a permanent collection of Egyptian and African art and the Gruenberg collection of miniature interiors. (901) 454–2224.

Graceland—Home of the late Elvis Presley located at 3764 Elvis Presley Blvd. Tour includes main floor and lower level of house, trophy room, and gravesite. Advanced reservations recommended. (901) 332–3322. Outside Tennessee (800) 238–2000.

Convention and Visitors Bureau of Memphis—12 South Main, Suite 107, Memphis, Tennessee 38103. (901) 526–1919. Write or call for further information.

FIELD TRIPS

Field trips are planned for Saturday, April 14, and all trips will leave from the Ramada Hotel parking lot (Mt. Moriah Road and I-240) in vehicles provided by Memphis State. Please pre-register because space will be limited. Times noted below refer to leaving from and returning to the Ramada Inn. If use of your own vehicle is preferred, please check with the field trip desk at the time of registration.

Collecting is permitted in the state park only if permits are from state authorities; no collections can be made on the other two trips.

1. Meeman-Shelby State Park (8 A.M.–3 P.M.): Just north of Memphis, this large area includes stands of rich, mesophytic woods on steep bluffs and ravines cut

into the loess deposits that parallel the east side of the Mississippi River. Geology, topography, and vegetation are similar to features found on Crowley's Ridge on the west wide of the river. Gum-cypress swamps and bottomland hardwoods are juxtaposed at the bases of bluffs nearest the river. Box lunches and drinks will be provided at Meeman Field Station, located within the boundaries of the park. Tom Heineke, Botanist for the Memphis District Corps of Engineers, and Guy Nesom, Department of Biology, Memphis State, will lead this trip. Two groups will be formed if registration demands—limit of 20 per group (\$3.00/person). Co-sponsored by the Ecological Society of America (Southeastern Chapt.).

2. *West Tennessee Plant Community Survey* (8 A.M.–4 P.M.): In a condensed area of Fayette County (about 1 hour east of Memphis) a number of contrasting plant communities are easily accessible. Communities to visit include xeric hardwoods on a sandhill some 600 feet in elevation and relatively atypical of west Tennessee, mesic upland hardwoods, bottomland hardwoods, and a gum-cypress swamp. Box lunches and drinks will be furnished. Larry Wilson, Botanist of the Pink Palace Museum of Memphis, will lead this trip. Limit of 15 (\$3.00/person). Co-sponsored by the Ecological Society of America (Southeastern Chapt.).

3. *Lichterman Nature Center* (9 A.M.–12 A.M.): A large, recently established, and well-staffed preserve within the Memphis city limits, with numerous efforts underway in research, conservation, and re-establishment of native organisms. The trip provides a survey of the wildflower greenhouses and re-establishment of native species on the preserve, marked nature trails, marshes with walkways, an observation platform, the animal rehabilitation center, and the main building with Ecology Center. Neil Miller, Department of Biology, Memphis State, and staff members of Lichterman Nature Center will lead this trip. There is no fee for this trip.

LOCAL ARRANGEMENTS COMMITTEE

Chairman:	James F. Payne	(901) 454-2955
Program:	James Jacob	(901) 454-2970
Pre-Registration and Registration	H. Delano Black	(901) 454-2252
Audio-Visual:	Melvin Beck	(901) 454-2970
Exhibits and Exhibitors:	Walter Wilhelm	(901) 454-2592
Field Trips:	Guy Nesom	(901) 454-2585
Social Activities:	Bonnie Gordon	(901) 454-2963
	Omar Smith	(901) 454-2585
Transportation and Parking:	Charles Biggers	(901) 454-2970
Host Hotel for Lodging Reservations	Ramada Hotel,	(901) 362-8010
	Mt. Moriah at I-240	

FEB. 1—IMPORTANT DEADLINE

(See Call-for-Papers for details)

Application for "Travel Awards" for students

Nomination for Meritorious Teaching Award

Entries for the Research Awards

ASB Pre-Registration for Memphis Meeting

(Type or print; one form for each registrant)

(Duplicate as needed)

NAME _____

DEPT. _____ SCHOOL _____

CITY _____ STATE _____ ZIP CODE _____

PLACE A CHECK MARK IN THE APPROPRIATE BLANKS.

PRE-REGISTRATION

Regular \$12.00 _____ Student \$6.00 _____

(Registration at the meeting will be: Regular \$14.00; Student \$8.00)

MEALS

ASB BANQUET

Regular \$10.00 _____

Student \$ 8.00 _____

Mississippi River Excursion
on The Memphis Showboat
(Dinner/Band 6-11 P.M.)

Regular \$10.00 _____

Student \$ 8.00 _____

BETA BETA BETA

Luncheon \$ 5.00 _____

SE Chapter, Ecological

Society of America

Luncheon \$ 7.00 _____

SE Society of Parasitologists

Luncheon \$ 7.00 _____

Southern Appalachian

Botanical Club/SE Section,

Botanical Society of America

Breakfast \$ 5.00 _____

FIELD TRIPS

Meeman-Shelby State Park

(8 A.M.-3 P.M.) \$ 3.00 _____

West Tennessee Plant

Community Survey

(8 A.M.-4 P.M.) \$ 3.00 _____

Make check for total amount payable to ASB Local Committee.

Send a completed copy of this form and your check *by April 1st* to: ASB Pre-registration, Department of Biology, Memphis State University, Memphis, Tennessee 38152.

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. R. L. Beckmann, Dept. of Botany, N.C. State Univ., Raleigh, NC 27650.

Name in full _____ Date _____

Title _____ Department _____

Institution _____

City _____ State _____ Zip _____

Degrees (institutions and dates) _____

Recommended by member _____

Annual Dues: ___ Graduate student \$5.00 ___ Regular \$10.00
 ___ Contributing \$12.00 ___ Sustaining \$25.00
 ___ Family \$12.00 ___ Library subscription \$12.00

Book Reviews

Day, Robert A. 1983. **How to Write and Publish a Scientific Paper**. 2nd Ed. ISI Press, 3501 Market St., University City Science Center, Philadelphia, PA 19104. 181 pp. \$11.95 softcover, \$17.95 hardcover.

For those with little or no experience in writing a thesis or scientific paper for publication, this book would be useful reading. The first 13 chapters describe the usual parts such as title, abstract, introduction, methods, results, discussion, citation of literature, tables, and illustrations—with the usual do's and don'ts. Six chapters deal with actual publication procedures emphasizing "how to." Five chapters treat specific types of papers—review, conference report, book review, thesis, and oral presentations. The last chapters deal with ethics, good and bad writing, avoiding jargon, and the use of abbreviations—with lists of examples in an appendix. This might make a good gift to a beginning graduate student, but for a constant reference on the desk, I prefer the CBE Style Manual. (*Ed.*)

Juniper, B. E. and C. E. Jeffree. 1983. **Plant Surfaces**. Edward Arnold, 300 N. Charles St., Baltimore, MD 21201. \$11.95. 93 pp, illus., paper.

Although first observed over 200 years ago, there has been a renewed interest and research activity in the cuticle and other surface features of plants by the morphologist, anatomist, physiologist, ecologist, and taxonomist. Also much concerned are the plant pathologists and entomologists. Through the use of SEM, TEM, gas/liquid chromatography, autoradiography, and other special techniques, the plant surface is seen as a dynamic adaptable envelope, flexible in both the import and export of materials, forming both an ecosystem in its own right and the first barrier and line of defense between the moist, concentrated, balanced cell and a hostile, ever-changing environment full of pathogens and predators. This little book includes basic morphology, with excellent scanning and transmission electron micrographs, elementary biochemistry, and a general and broad discussion of evolution, ontogeny, and adaptive significance of various surface features. It is recommended as a fine introduction to the topic and with appropriate references to take the reader deeper if needed. (*Ed.*)

News of Biology in the Southeast

Jon R. Fortman—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

Tuskegee Institute, Department of Biology. *Mrs. Helen Benford* has returned to full-time teaching duties after a leave of absence to pursue Ph.D. work at Auburn University. *Dr. James H. M. Henderson* has co-authored a chapter in the new book *Handbook of Plant Cell Culture* (Macmillan Publishing) with Drs. B. R. Phills and B. T. Whatley. The chapter, which will be in Volume 2, *Crop Species*, is entitled "Root and Tuber."

University of Alabama in Huntsville, Department of Biological Sciences. *Dr. Sam Campbell* recently completed a twelve-month sabbatical study in cell biology at Baylor University, where he worked on the reproductive biology of estrogen translocation, and its relationship to elements of the cytoskeletal system. *Dr. Richard Modlin* was recently promoted to the rank of Associate Professor. *Dr. Harold Wilson* was recently promoted to the rank of Professor. *Dr. William Garstka* (Ph.D. Harvard University), with research interests in reproductive biology and behavior among reptiles, has been appointed to the faculty. Another new faculty member is *Dr. William Zahorchak* (Ph.D. Michigan State University) whose research is in the area of physiology of human bacterial pathogens.

Florida

University of Florida, Department of Botany. *Dr. W. L. Stern* has been elected to the office of President-Elect of the Botanical Society of America. *Dr. Henry C. Aldrich* is on a steering committee for a University wide facility called the Major Analytical Instrumentation Center which serves the entire campus. Its purpose is to acquire and make available large and technically complicated analytical tools that might otherwise be out of reach of individual departments. Instruments of interest to biologists include an ESCA unit (X-ray photoelectron spectroscopy) and a 200 KV scanning-transmission electron microscope with X-ray analysis capability. One-week training courses are offered in use of these facilities. Inquiries should be directed to *Dr. John Hren*, MAIC, 256 Rhines Hall, University of Florida, Gainesville, FL 32611. *Dr. David S. Anthony* retired July 29, 1983. *Dr. Anthony* has been appointed by Governor Bob Graham to a new legislatively established seven-member Marine Fisheries Commission which will exercise broad powers over the state's salt water resources. *Dr. Anthony* is also chairman of the board of directors, Florida Audubon Society. *Dr. George Bowes* presented a poster paper at the Sixth International Congress on Photosynthesis in Brussels, Belgium in August. *Professor Yasunori Nakamura* from the Radioisotope Center, University of Tokyo, visited *Dr. Bowes'* laboratory for one month to work on the regulation of PEP carboxylase enzyme. The results of this collaboration were presented at the Annual Meeting of the American Society of Plant Physiologists in August by *Dr. Michael Salvucci*, a recent graduate of *Dr. Bowes'* lab. *Dr. Walter S. Judd* has been promoted to Associate Professor, with tenure. *Dr. J. T. Mullins* attended the Third International Mycological Congress in Tokyo, August 28–September 3, and participated in a symposium on "Sexual Morphogenesis in Phycomycetes."

Louisiana

Loyola University, Department of Biological Sciences. *Dr. Kenneth Shull* has been named Chairman of the Department of Biological Sciences. He was Visiting Researcher in the Department of Biology

at Mississippi State University this past summer. *Dr. Michael Willig* won the 1983 ASB research prize awarded each year at the annual meeting. *Dr. E. Letitia Beard* is spending a sabbatical year as visiting professor in the research lab in the Department of Physiology and Biophysics at Harvard Medical School. *Dr. Roland Lesseps* is currently serving as a member of the Board of Trustees at Loyola University. *Drs. Kenneth Gobalet* and *David White* have joined the faculty this year.

McNeese State University, Department of Biological and Environmental Sciences. The departments of biology and environmental sciences/microbiology have been combined to form one department. *Dr. George White*, former Head of Biology, has retired and *Dr. L. Harold Stevenson* will serve as the new Head. Stevenson has been at McNeese for two years serving as the Head of Environmental Science/Microbiology.

Southern University, Health Research Center. Two research assistantships (one undergraduate and one graduate) are available for minority students, since the grant is under the auspices of Minority Biomedical Research Support Program. Interested persons should contact *Dr. Syed Naqvi* or *Nusrat Naqvi*, Health Research Center, Southern University, Baton Rouge, Louisiana 70813.

Mississippi

Gulf Coast Research Laboratory, Ocean Springs. A formal teaching affiliation has been approved between the GCRL and Lincoln Memorial University of Harrogate, TN. *Dr. James I. Jones*, director of the Mississippi-Alabama Sea Grant Consortium, was elected President-Elect of the National Sea Grant Association. The William M. Shoemaker Toxicology Building was dedicated recently on the Ocean Springs campus. The facility has already proved a cost-effective investment for the State of Mississippi, enabling the Laboratory to compete on a national basis for contract and grant funds to use for estuarine toxicology.

North Carolina

Queens College, Department of Biology. *Dr. Virginia L. Martin* has been awarded the first Carol G. Belk Fellowship for the period July 1, 1983 through June 30, 1985. The Queens faculty cultural enrichment committee chose *Dr. Martin's* proposal for a study tour to the Galapagos Islands, followed by graduate course work in human anatomy, as the winning proposal among those submitted by other faculty members.

Guilford College, Biology Department. *Dr. Robert R. Bryden* has retired from the faculty after 22 years of service. *Dr. Charles G. Smith*, formerly of Lake Erie College, has joined the faculty.

Warren Wilson College, Department of Biology. *Dr. Alan Haney*, along with four students, conducted a research program this summer in Superior National Forest, where he is investigating the changes in community structure of mixed pine forests developing from clearcut logging as compared to those developing after wildfire.

North Carolina State University, Department of Horticultural Science. The following have joined the faculty with 90% research responsibilities and some teaching duties: *Dr. Sylvia M. Blankenship* (Ph.D. Oregon State University), post-harvest pomology; *Dr. Ron G. Goldy* (Ph.D. University of Florida), breeding and genetics of small fruits. The position of *Dr. Paul R. Fantz* has been reclassified to a 12-month position with teaching duties in plant materials, and research responsibilities in taxonomy of horticultural crops. *Dr. Wanda Collins* presented a paper on fuel alcohol production from sweet potatoes at the Sixth International Symposium on Tropical Root and Tuber Crops at Lima, Peru.

Duke University, Department of Botany. A course/Conference on the Genetics and Molecular Biology and *Chlamydomonas* was held at the Banbury Conference Center, Cold Spring Harbor Laboratory, June 26-June 30, 1983. The course was planned and organized by *Drs. N. W. Gillham, J. E. Boynton*, and *E. H. Harris* (Duke University), *D. J. Luck* (Rockefeller University), and *U. Goodenough* (Washington University). Fifty scientists from the USA and Europe participated. An invited talk, "The Biogenesis of Chloroplast Ribosomes," was given by Professor John E. Boynton at the Gordon Research Conference on Extra-Chromosomal Elements. *Dr. Jonathan P. Hosler* received one of the 24 NSF postdoctoral fellowships in plant biology awarded nationally in June. His research on the "Regulation of Chloroplast Ribosomal Protein Genes in *Chlamydomonas reinhardtii*" will be carried out with *Drs. Boynton* (Botany) and *Gillham* (Zoology). A scientist from Ehime University, Matsuyama, Japan, *Dr. Yasushi Hashimoto*, has been on study leave to the Duke University Phytotron since March, 1983. An Associate Professor of Agricultural Engineering, *Dr. Hashimoto*, is a specialist in automated, computerized control of plant environments. *Dr. Paulette Bierzychudek*, a member of

the Department of Biology at Pomona College, will be in the Department of Botany at Duke this academic year on a NSF Visiting Professorship for Women. *Dr. W. Dwight Billings* was appointed as Adjunct Professor at (1) Desert Research Institute, University of Nevada, Reno, and (2) Institute of Arctic Biology, University of Alaska, Fairbanks. He was also appointed to the NAS-NRC Committee on the Causes and Effects of Changes in Stratospheric Ozone. During the Spring, a new book by *Dr. Paul J. Kramer* "Water Relations of Plants" was published by Academic Press. During the Winter "Crop Reactions to Water and Temperature Stresses in Humid, Temperate Climates" edited by *C. D. Raper, Jr.* of NCSU and *Paul J. Kramer*, Duke, was published by Westview Press. It contains the papers presented at a workshop held on the Duke campus in 1980. *Dr. Kramer* participated in the Second Annual Plant Biochemistry-Physiology Symposium at the University of Missouri, with a paper "Progress and Problems in Water Stress Research." *Dr. Stephen Johnston*, Postdoctoral Associate at the Hershey Medical Center, Pennsylvania State, will join the faculty as an Assistant Professor this Fall. *Dr. Johnston's* studies are centered on regulatory genes in yeast and utilize techniques of gene cloning, yeast-plant gene shuttles, gene sequencing, and classical genetic analysis.

East Carolina University, Department of Biology. A new course, Biotechniques, was instituted in the Spring of 1983. The course, consisting of two hours of lecture and twelve hours of laboratory each week, will be part of a curriculum in biotechnology being developed by the department. *Dr. Kathleen E. Kennedy* (Ph.D. Vanderbilt University) joined the faculty as Assistant Professor in the Fall of 1983. *Dr. Kennedy* recently completed postdoctoral research at the Biozentrum of the University of Basel, Switzerland. *Dr. Ernest A. Matson* (Ph.D. The University of Connecticut) has been appointed Visiting Assistant Professor. *Dr. Donald B. Jeffreys* has taken early retirement because of illness, and has been awarded the rank of Professor Emeritus. *Dr. Jeffreys* is a graduate of Roanoke College and the University and joined the faculty at East Carolina in 1960. *Dr. Edward P. Ryan* spent seven months on sabbatical leave doing research at the marine station of the University of Liverpool, at Port Erin on the Isle of Mann.

University of North Carolina at Charlotte, Department of Biology. On September 7, 1983, the dedication of a new greenhouse/conservatory facility occurred. The new botanical and horticultural complex will combine the objectives of university teaching, research, and public conservatory. The funds for this complex were exclusively private, the major donors being Dorothy and Thomas M. McMillan. The buildings were dedicated in their name. *Dr. T. Lawrence Mellichamp*, a botanist and horticulturist on the faculty, will be the director of the greenhouse/conservatory.

North Carolina State University, Department of Botany. *Drs. Udo Blum, Tom Wentworth*, and graduate students *John Bell* and *Steve Bryne* presented papers, and *Dr. Jerry Miksche* presided at the meeting of the newly organized council of plant science departmental administrators at Grand Forks AIBS meeting. *Drs. Ralph Mott* and *Henry Amerson* attended a week long international meeting at Tacoma, Washington dealing with tissue culture research. *Dr. Wendy Boss* attended a membrane conference in Basel, Switzerland and presented her work on membranes. She also gave an invited seminar in Mainz, Germany in conjunction with a membrane conference in Toulouse, France.

South Carolina

Furman University, Department of Biology. *Dr. Lewis P. Stratton* has completed the programming phase of a project to computerize the records for the 20,000 plus specimens in the Ives Herbarium. The project will make the collection more accessible and useful to students and faculty, and other botanists that utilize this facility for research and reference work. A similar project will soon be started for the vertebrate and invertebrate collections.

Tennessee

Memphis State University, Department of Biology. *Dr. Neil A. Miller* was recently selected as Environmental Education Teacher of the Year for Tennessee by the Tennessee Federation of Garden Clubs.

Belmont College, Department of Biology. *Dr. Donald R. Ramage* has become Dean, School of Sciences. *Dr. Ramage* was chairman of the Department of Biology for 13 years.

The University of the South, Department of Biology. *Dr. George S. Ramsaur* has been appointed department chairman replacing *Dr. Charles W. Foreman*, who has served in this capacity for the past six years. *Dr. Ronald B. Toll* has recently joined the faculty. He is a 1982 graduate of the University of Miami, and did postdoctoral work at the Division of Mollusks, Museum of Natural History. The

Smithsonian Institution. *Dr. Harry C. Yeatman*, who retired in 1981, will return this spring to teach one course as Brown Foundation Tutor. Dr. Yeatman was the University's first Kenan Professor.

The University of Tennessee, Knoxville, Department of Botany. On May 28, 1983, *Dr. A. J. Sharp* was among five bryologists awarded honorary membership in the Sociedad Latinoamericana de Briologia during the World Conference on Bryology held in Tokyo, Japan. *Dr. Walter Herndon* has returned to teaching and research as of September 1, 1983. He served as Botany Department Head, Associate Dean of the College of Liberal Arts, and Vice Chancellor for Academic Affairs over the past 22 years.

Memphis State University, Biology Department. The State of Tennessee has approved a toxicology concentration within the Biology Department at MSU. This new program, coordinated by *Dr. S. J. Klaine*, will allow students to gain toxicology training at the undergraduate level. This is the only undergraduate program in toxicology in the Mid-South. Students in the program will take chemistry courses through biochemistry as well as satisfy the major in Biology. There are four toxicology courses including an internship program that allows students to gain practical experience in industrial, environmental, or clinical toxicology laboratories. For more information, contact Dr. S. J. Klaine, Department of Biology, Memphis State University, Memphis, TN 38152, phone 901-454-2955.

Virginia

Randolph-Macon Woman's College, Department of Biology. *Jan L. Beyers*, (Ph.D. Duke University) has been appointed Assistant Professor of Biology. She replaces *Dr. Dorothy Crandall Bliss*, who retired in June of 1983.

West Virginia University

Jesse F. Clovis, Plant Taxonomist, retired May 15, 1983, after 26 years of teaching. *Stephen Tonsor* (Ph.D. University of Chicago) and *Jeffry Travis* (Ph.D. University of Dartmouth) have joined the faculty as Assistant Professor of Plant Population-genetics, and Visiting Assistant Professor in Cell Biology, respectively.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

Florida State Museum, University of Florida. On April 4, 1983, the Florida State Museum courtyard was the scene of dedication ceremonies. This event honored the man who is responsible for the very existence of the Museum Building—*Dr. Joshua Clifton Dickinson, Jr.* Henceforth the Museum Building will be known as "Joshua C. Dickinson Hall." Dr. Dickinson has served the University of Florida for 37 years, from Instructor of Biology to Curator of Biological Sciences and Professor of Zoology and Director of the Museum. In 1979, he retired as Professor Emeritus of Zoology and Director Emeritus of the Florida State Museum. He joined the Museum in 1953, while it was still located in the Seagle Building (originally constructed as a hotel) in downtown Gainesville, and the staff consisted of one secretary, one curator, and one preparator who also served as Acting Director. He became the Director in 1961, and set the Museum on the course that was to bring it international respect and renown.

SYMPOSIUM

The first **Atlantic White Cedar (*Chamaecyparis thyoides* (L.) B.S.P.) Ecosystems Symposium** at the Marine Biological Laboratory, Woods Hole, Massachusetts, October 9–11, 1984. Sponsored by The Society of Wetland Scientists, Eastern Region.

The objectives of the Symposium are: (1) to assess the current state of knowledge in the field, (2) to stimulate research on a broad range of biological, chemical, and physical properties of Atlantic White Cedar bogs, (3) to encourage cooperative research and interchange of ideas between investigators and resource management personnel, and (4) to promote guidelines for rational management, regulation, and protection of cedar wetlands. Research and Management papers are invited. **Deadline for**

titles: *February 1, 1984. Deadline for abstracts: April 1, 1984.* Arrangements are being made for publication of Symposium Proceedings.

Arrangements: Registration Fee, \$25; Lodging at the MBL Swope Center overlooking Eel Pond. \$38/day, dbl occupancy or \$49/day, single occupancy (includes 3 meals/day, refreshment breaks, reception, banquet). For information and all correspondence, contact: *Dr. Aimlee Laderman, Symposium Chairman, Box 689, Woods Hole, MA 02543. Phone 617/548-5618.*

ABOUT BIOLOGICAL STATIONS

Highlands Biological Station

Research—The Station will support research in field biology of the southern Appalachians in 1984 through its grant-in-aid program. Support will be available at both the pre- and post-doctoral level. Particularly meritorious research proposals will be considered for the Thelma Howell Memorial Scholarship. Preference in making awards is given to projects involving residence at the Station. The deadline for submission of proposals is March 1. Awards will be announced on or about April 1.

Summer field courses in 1984—

Field Bryology of the Southern Appalachians

Lewis E. Anderson, Duke University

June 4–July 6; 6 semester hrs. credit

Simulation of Ecosystem Dynamics

Stephen G. Boyce, Duke University and USDA Forest Service

July 9–20; 3 semester hrs. credit

Biology of Lower Vascular Plants

A. Murray Evans, University of Tennessee

July 9–August 10; 6 semester hrs. credit

Some financial aid may be available to qualified students in field courses. Credit for courses is given through both the University of North Carolina at Chapel Hill and Western Carolina University.

For further information contact: The Highlands Biological Station
P.O. Box 580
Highlands, NC 28741

Mountain Lake Biological Station

Summer field courses in 1984—

First Term (June 11–July 14)

Herpetology

Douglas H. Taylor, Miami University of Ohio

Ornithology

Val Nolan, Jr., Indiana University

Plant Ecology

Elizabeth Lacey, University of North Carolina–Greensboro

Quantitative Methods in Field Biology

Joseph Travis, Florida State University

Workshop in Allozyme Techniques

Charles R. Werth, College of William and Mary

Second Term (July 16–August 18)

Biology of Insects

George W. Byers, University of Kansas

Community Ecology

Norman Christensen and Henry Wilbur, Duke University

Freshwater Ecology

Daniel J. Hornbach, University of Virginia

Natural History of the Southern Appalachians

Robert C. Simpson, Lord Fairfax Community College

Nature Photography

Robert C. Simpson, Lord Fairfax Community College

Workshop in Allozyme Techniques

Charles R. Werth, College of William and Mary

Scholarships Available: Service Awards for students covering room and board costs.

Post-doctoral Fellowships available for summer research. These awards are for the purpose of promoting field research by young investigators who have recently received their Ph.D. degree. Proposals will be considered for a wide variety of ecological and evolutionary studies. Deadline for applications: 1 April 1984.

For further information and applications contact: Dr. Jerry O. Wolff, Director
Mountain Lake Biological Station
Gilmer Hall
University of Virginia
Charlottesville, VA 22901

U.S. Postal Service STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION <i>Required by 39 U.S.C. 3685</i>			
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The ASB

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April 1984



45th Annual Meeting, Memphis State University

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Volume 31, Number 2 - April 1984

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COVER

Top left: Ellington Hall, Biological Sciences; top right: statue of W. C. Handy, Handy Park in Memphis; lower right: Mississippi River and Memphis skyline; lower left: Life Sciences Building. *Photographs by David Elmendorf, Memphis State University.*

TIME AND PLACE OF FUTURE MEETINGS

1985 April 10–13	Middle Tennessee State University, Murfreesboro
1987	University of Georgia, Athens (50th Anniversary)

PATRON MEMBERS

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Program of the 45th Annual Meeting of the Association of Southeastern Biologists

Memphis State University

SOCIETIES MEETING WITH ASB IN MEMPHIS

**American Society of Ichthyologists and Herpetologists, Southeastern Division
Beta Beta Beta, Southeastern Region
Botanical Society of America, Southeastern Section
Ecological Society of America, Southeastern Chapter
Southeastern Society of Parasitologists
Southern Appalachian Botanical Club**

GENERAL INFORMATION

Registration—Registration for the 45th annual meeting of the Association of Southeastern Biologists, purchase of tickets for the banquet, breakfasts, luncheons, and other special events should have been arranged through pre-registration with the Local Arrangements Committee. Pre-registrants may obtain their information packet and tickets at the Ramada Hotel registration desk on Wednesday, April 11 from 5 P.M. until 9 P.M. On Thursday and Friday, April 12 and 13, packets and tickets will be available at the ASB registration booth on the third floor of the University Center. Late registration is possible at these times and locations. Late registration fees are \$8.00 for students and \$14.00 for regular members.

Parking and Shuttle Service—ASB registrants and guests may park on campus in any space not marked with restrictions. Parking lots south of Southern Avenue and east of the University Center are a short walk from the University Center where all paper sessions will be held. Additional parking is available at other locations as noted on the campus map (inside back cover). Parking facilities are especially crowded during morning hours; however, adequate parking should be available *prior to 7:45 A.M.* Morning and afternoon shuttles will run between the Ramada Hotel and the University Center. Consult the transportation schedule upon arrival.

Placement Service—Message boards are available for those wishing to post job announcements and for those seeking positions.

Dining and Lounge Facilities—Meals may be obtained in the University Center Commons. In addition, a map showing the location of fast food outlets in the

Memphis State area is included with the registration packet. Memphis boasts many excellent dining establishments, and a list of some of these is included in the registration packet. Additional information on Memphis restaurants and their menus may be obtained from personnel at the main registration desk.

Social Activities for Conference Guests—During the day on Thursday and Friday, April 12 and 13, activities are planned for guests not participating in the meetings and sessions. *Early sign-up* at the University Center is required since limited spaces are available. These activities include:

Graceland Tour (former home of Elvis Presley) and lunch at Overton Square, a major attraction in the city's center. (Thursday, April 11, 9:00 A.M.–2:30 P.M. with fee required; luncheon is dutch treat.)

Dixon Gardens and Gallery Tour and lunch at a restaurant in the Hickory Ridge Mall. (Friday, April 12, 9:45 A.M.–3:00 P.M.)

Riverboat Ride and Dinner aboard the Memphis Showboat—Take a historic paddleboat steamer for a 2½ hour ride on the Mississippi. Price includes a seated dinner and music by the Steamboat Strummers. If you did not preregister, inquire early for reservations. (Thursday evening 6:30 P.M.–10:00 P.M.)

The ASB Banquet—The ASB Banquet and program will be held in the Hospitality Room of the Stroh Brewing Company. The Stroh Belle is a replica of the interior of an old riverboat, and a barbeque dinner will be served. Accommodations and hospitality are compliments of Stroh. Round trip transportation from Ramada Hotel and University Center included in reservation.

Field Trips—Field trips depart from the Ramada Hotel on Saturday morning. The fee includes a box lunch. 1. West Tennessee Plant Community Survey (8 A.M.–4 P.M.)—\$3.00; 2. Mecman-Shelby State Park (8 A.M.–3 P.M.)—\$3.00.

Tickets for Scheduled Meals and Events—Pre-registrants will receive the requested meal and special event tickets with their registration packets. A *limited* number of tickets for some events will be available for those who did not pre-register.

BREAKFASTS, LUNCHEONS, DINNERS, AND SPECIAL EVENTS. Southeastern Chapter of the Ecological Society of America (Friday luncheon)—\$7.00; Southeastern Society of Parasitologists (Friday luncheon)—\$7.00; Southern Appalachian Botanical Club and Southeastern Section, Botanical Society of America (Friday breakfast)—\$5.00; Beta Beta Beta (Friday luncheon)—\$5.00; Mississippi River Excursion aboard the Memphis Showboat, dinner included (Thursday evening)—Student \$8.00, Regular \$10.00; ASB Banquet—Stroh Belle (Friday evening)—Student \$8.00, Regular \$10.00.

Useful Telephone Numbers (Area Code 901)—

University Switchboard 454-2000

Memphis State Information 454-2040

Memphis State Security 454-2212

Memphis State Biology Dept. 454-2955 or 454-2581

University Events 454-2079

Memphis State Health Center 454-2287

Ecological Research Center 454-2594

Ramada Hotel (Host Hotel) 362-8010

The Peabody Hotel 529-4000
Quality Inn East 767-6300
Holiday Inn Poplar at I-240 682-7881
Ambulance Service, City of Memphis 458-3311
Minor Emergency Clinic 795-0385
Memphis Police Department 528-2222

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Social Activities: Bonnie Gordon & Omar Smith 454-2963
Transportation and Parking: Charles Biggers 454-2970
Host Hotel for Lodging Reservations: Ramada Hotel, Mt. Moriah at I-240
362-8010

Program Summary

WEDNESDAY, APRIL 11, 1984

- 5:00 P.M.–9:00 P.M. Pick up registration packets by pre-registrants; Late registration, Ramada Hotel (see map on back)
- 6:00 P.M.–11:00 P.M. Social mixer with cash bar, Ramada Hotel
- 7:00 P.M. Executive Committee Meeting, Ramada Hotel

THURSDAY, APRIL 12, 1984

- 7:00 A.M.–4:00 P.M. Pick up registration packets by pre-registrants; Late Registration and Information, University Center
- 7:30 A.M. Past Presidents' Breakfast, University Center 310K
- 8:00 A.M.–5:00 P.M. Exhibits, Faulkner Lounge, University Center
- 8:00 A.M.–5:00 P.M. Placement Service, University Center
- 8:00 A.M.–4:00 P.M. Beta Beta Beta Registration, Ellington Hall

Paper Sessions: University Center

- 8:00 A.M.–11:00 A.M. Plant Ecology, Session I, University Center Ballroom
- 8:00 A.M.–9:15 A.M. Ichthyology and Herpetology, Session I, Room 310B and C
- 8:00 A.M.–10:45 A.M. Aquatic Ecology, Session I, Room 310E
- 8:00 A.M.–11:00 A.M. Plant Morphology, Session I, Room 310F
- 8:00 A.M.–10:30 A.M. Invertebrate Zoology, Session I, Room 310G
- 8:00 A.M.–10:45 A.M. Plant Systematics, Session I, Room 310H
- 8:00 A.M.–11:00 A.M. Animal Ecology, Session I, Room 310J
- 9:45 A.M.–11:00 A.M. Ichthyology and Herpetology, Session II, Room 310B and C
- 9:45 A.M.–11:00 A.M. Plant Physiology, Session I, Room 310F

Plenary Session: University Center Ballroom

- 11:15 A.M.–12:30 P.M. *Welcome:* **Dr. Jerry Boone**, Vice President for Academic Affairs, Memphis State University
- Response:* **Dr. Charles Jenner**, ASB President, University of North Carolina
- Featured Address:* "Carbon Dioxide in the Atmosphere: The Role of the Biota," **Dr. George M. Woodwell**, Director of the Ecosystems Center of the Manne Biological Laboratory, Woods Hole, Massachusetts.

Paper Sessions: University Center

- 1:30 P.M.–4:30 P.M. Plant Ecology, Session II, University Center Ballroom
- 1:30 P.M.–3:00 P.M. Ichthyology/Herpetology, Session III, Room 310B and C
- 1:30 P.M.–3:00 P.M. Aquatic Ecology, Session II, Room 310E
- 1:30 P.M.–4:30 P.M. Parasitology, Session I, Room 310F
- 1:30 P.M.–4:30 P.M. Plant Systematics, Session II, Room 310H
- 1:30 P.M.–3:00 P.M. Animal Ecology, Session II, Room 310J

1:55 P.M.–4:30 P.M.	Symposium: Mississippi River Delta Lakes, Room 310G; Organized by Charles M. Cooper and Jerry C. Ritchie
1:30 P.M.–5:00 P.M.	Beta Beta Beta Field Trip, depart from Ellington Hall parking lot
3:30 P.M.–4:00 P.M.	Business Meeting, American Society of Ichthyologists and Herpetologists, SE Division, Room 310B and C
4:00 P.M.–4:30 P.M.	Business Meeting, Southeastern Fishes Council, Room 310B and C
6:30 P.M.–10:00 P.M.	Mississippi River Cruise and Dinner, <i>Memphis Showboat</i>

FRIDAY, APRIL 13, 1984

7:00 A.M.–8:45 A.M.	Business and Breakfast Meeting, Southern Appalachian Botanical Club and Southeastern Section, Botanical Society of America, University Center Commons, West
8:00 A.M.–4:00 P.M.	Information and Late Registration, University Center
8:00 A.M.–Noon	Exhibits, Faulkner Lounge, University Center
8:00 A.M.–3:00 P.M.	Placement Service, University Center
8:30 A.M.–11:00 A.M.	Beta Beta Beta tour of Department of Biology

Paper Sessions: University Center

7:55 A.M.–11:00 A.M.	Symposium: Selected Conservation Issues in West Tennessee, Room 310J; Organized by Frank P. Day
8:45 A.M.–11:00 A.M.	Plant Ecology, Session III, Room 310B and C
8:00 A.M.–9:30 A.M.	Ichthyology and Herpetology, Session IV, Room 310E
8:00 A.M.–11:00 A.M.	Parasitology, Session II, Room 310F
8:45 A.M.–11:00 A.M.	Cryptogamic Botany, Session I, Room 310G
8:45 A.M.–9:30 A.M.	Plant Systematics, Session III, Room 310H
10:00 A.M.–11:00 A.M.	Special Session: Problems in Southeast Herbaria—A forum for Curators and Users, Room 310

Business and Luncheon Meetings

11:15 A.M.–12:15 P.M.	ASB Annual Business Meeting, Room 310B and C
12:30 P.M.–2:15 P.M.	Business and Luncheon Meeting of Southeastern Chapter of Ecological Society of America, Eugene P. Odum speaker, University Center Ballroom
11:45 A.M.–1:15 P.M.	Beta Beta Beta Luncheon, Richardson Towers
12:30 P.M.–2:15 P.M.	Business and Luncheon Meeting of the Southeastern Society of Parasitologists, University Center Commons, West

Paper Sessions

1:30 P.M.–4:15 P.M.	Plant Ecology, Session IV, Room 310B and C
1:30 P.M.–4:00 P.M.	Animal Physiology, Session I, Room 310E
3:30 P.M.–4:30 P.M.	Parasitology, Session III, Room 310F
1:30 P.M.–3:00 P.M.	Cryptogamic Botany, Session II, Room 310G
1:30 P.M.–4:30 P.M.	Cytology and Genetics, Session I, Room 310H
1:30 P.M.–2:45 P.M.	Cell and Molecular Biology, Session I, Room 310J
1:30 P.M.–5:30 P.M.	Beta Beta Beta Paper Sessions and Business Meeting, Ellington Hall
3:30 P.M.–4:30 P.M.	Teaching Biology, Session I, Room 310H
3:30 P.M.–4:30 P.M.	Microbiology, Session I, Room 310J

Social Hour and ASB Banquet

6:00 P.M.–7:30 P.M. Social Hour, Stroh Belle
7:30 P.M. ASB Banquet, Stroh Belle
Presentation of Awards
Past President's Address, **Dr. Margaret L. Gilbert**

SATURDAY, APRIL 14, 1984

8:00 A.M. Executive Committee Meeting, Ramada Hotel
8:00 A.M. Field trip: West Tennessee Plant Community Survey, departs Ramada Hotel parking lot
8:00 A.M. Field trip: Meeman-Shelby State Park, departs Ramada Hotel parking lot

NOTES

The Thursday Morning General Session

CO₂ in the Atmosphere: The Role of the Biota

The speaker for the 1984 general session is *Dr. George M. Woodwell*, Director of the Ecosystems Center of the Marine Biological Laboratory, Woods Hole, Massachusetts.

Dr. Woodwell earned a B.A. from Dartmouth College and holds an M.A. as well as a Ph.D. from Duke University. Dr. Woodwell is a past President of the Ecological Society of America. He is a Fellow of AAAS and of the American Academy of Arts and Sciences. He has been a member of the Boards of Trustees of various academic and conservation organizations including the Conservation Foundation, Environmental Defense Fund, and the Sea Education Association. He is currently Vice-Chairman of the Natural Resources Defense Council and Chairman of the World Wildlife Fund. Dr. Woodwell has served on various editorial boards including that of the *Quarterly Review of Biology* and *The Biological Bulletin*. He has published more than 200 papers in such journals as *Science*, *Scientific American*, *BioScience*, *Ecology*, and *The Journal of Ecology*.

Dr. Woodwell has written many articles concerned with CO₂ in the atmosphere, and is eminently qualified to present a lecture on this important topic.

This presentation is co-sponsored by ASB and the Southeastern Section of the Botanical Society of America.

ASB Paper Sessions and Symposia

THURSDAY MORNING, APRIL 12

Plant Ecology, Session I—UC Ballroom

Presiding: *Dr. William H. Martin*, Eastern Kentucky University.

- 8:00 1. Schneider, Rebecca L. and Rebecca R. Sharitz. (Savannah River Ecology Laboratory). The Influence of Water Vectors on Seed Availability in a Riverine Swamp Forest.
- 8:15 2. Potter, David M., Laura F. Huenneke, and Rebecca R. Sharitz. (Savannah River Ecology Laboratory). Distribution and Abundance of *Taxodium distichum* (L.) Rich. and *Nyssa aquatica* L. Seedlings in a Floodplain Receiving Thermal Effluents.
- 8:30 3. West, Brenda K. and Dan K. Evans. (Marshall University). Vegetation of Disturbed Wetlands in the Kanawha River Floodplain, West Virginia.
- 8:45 4. Gladden, J. B., D. M. Waters, R. M. Muzika, and J. D. Haddock. (Savannah River Ecology Laboratory). Woody Plant Species Recovery in Disturbed Coastal Plain Bottomland Ecosystems.
- 9:00 5. Huenneke, Laura F. and Rebecca R. Sharitz. (Savannah River Ecology Laboratory). The Role of Microtopography in Woody Plant Regeneration in a Cypress-Tupelo Swamp.
- 9:15 BREAK
- 9:45 6. Sharitz, Rebecca R.¹ and John R. Jensen.² (Savannah River Ecology Laboratory¹ and University of South Carolina²). Use of Remote Sensing Data to Map Southeastern Swamp Vegetation.
- 10:00 7. Symbula, Millie and Frank P. Day, Jr. (Old Dominion University). Comparison of Root Production Methods in Swamp Soils.
- 10:15 8. Anderson, Peggy B. and G. R. Best. (University of Florida). Mechanisms of Recovery of Woody Plants in Forested Wetlands Following Burning.
- 10:30 9. Kovacic, David A. and Kenneth W. McLeod. (Savannah River Ecology Laboratory). A Comparison of Forest Nutrient Dynamics in South Carolina and New Mexico Following Prescribed Burning.
- 10:45 10. Gyllenhaal, Charlotte. (University of Alabama). Nutrient Dynamics During Slash-and-Burn Cultivation Under Young Secondary Forest in Panama.

Ichthyology and Herpetology, Session I—UC 310B & C

Presiding: *Dr. David G. Lindquist*, University of North Carolina at Wilmington.

- 8:00 11. Wieland, Werner and John S. Ramsey. (Mary Washington College and Alabama Cooperative Fishery Research Unit, Auburn University). Life History of the Muscadine Darter, *Percia* sp. cf. *P. macrocephala* in the Tallapoosa River, Alabama.
- 8:15 12. Heins, David C. (Tulane University). Life History Traits of the Florida Sand Darter, *Ammocrypta bifascia* Williams, and Comparison with the Naked Sand Darter, *Ammocrypta beani* Jordan.
- 8:30 13. Reagan, Nancy and Jerry L. West. (Western Carolina University). Life History of the Mottled Sculpin in a Western North Carolina Stream.
- 8:45 14. Rabito, Felix and David C. Heins. (Tulane University). Reproduction of the Weed Shiner, *Notropis texanus* (Girard), in the Choctawhatchee River.
- 9:00 15. Maurakis, Eugene and Jules J. Loos. (The George Washington University and Potomac Electric Power Company). Nest Building and Spawning of *Semotilus lumbee* (Pisces: Cyprinidae).

Aquatic Ecology, Session I—UC 310E

Presiding: *Dr. Luther A. Knight*, University of Mississippi.

- 8:00 16. Yelverton, G. Frank and Courtney T. Hackney. (University of North Carolina at Wilmington). Export of Dissolved Organic Carbon (DOC) from the Substrate of a North Carolina Salt Marsh.
- 8:15 17. Stout, Ben M. III. (Tennessee Technological University). Leaf-Litter Processing in Lotic and Lentic Waters of Southeastern Tennessee.
- 8:30 18. De La Cruz, Armando A., Augustus Mamaril, and James D. Yarbrough. (Mississippi State University). The Role of Aquatic Weeds in Maintaining Surface Water Quality.
- 8:45 19. Shaffer, Gary P. and Peter Cahoon. (Louisiana State University and The University of British Columbia). The Factors Controlling Benthic Microfloral Primary Production in Wetland Ecosystems on the West and Gulf Coasts of the U.S.A.
- 9:15 BREAK
- 9:45 20. Clayton, Janet L. and R. Don Estes. (Tennessee Technological University). Larval and Young of the Year Fish Populations of Woods Reservoir.
- 10:00 21. Moore, John T. and Jerry L. West. (Western Carolina University). Relationships Between Suspended Solids and Trout Standing Crop Biomass and Recruitment in Selected Western North Carolina Streams.
- 10:15 22. Fury, Jon R. and R. Don Estes. (Tennessee Technological University). An Investigation into the Declining Aquatic Macrophyte and Fish Populations of Woods Reservoir, Tennessee.
- 10:30 23. Millican, Troy and Jim Pennington. (Southeastern Louisiana University and U.S. Army Engineers, Vicksburg). Biological Impacts of Dike Field Disposal in the Arkansas River.

Plant Morphology, Session I—UC 310F

Presiding: *Dr. J. M. Herr, Jr.*, University of South Carolina.

- 8:00 24. Perry, James W. (Frostburg State College). Structure of Microsclerotia of *Verticillium dahliae* in Roots of Russet Burbank Potato Plants.
- 8:15 25. Oyofe, Buhari A.,¹ John E. Mayfield,¹ and Daniel M. Schmitt.² (Atlanta University¹ and Northeastern Forest Experiment Station²). Effects of Budworm, *Choristoneura fumiferana*, Herbivory on Balsam Fir, *Abies balsamea*, Bud at the Ultrastructural Level.
- 8:30 26. Curtis, John D. and Nels R. Lersten. (University of Wisconsin—Stevens Point and Iowa State University). Development of a Previously Undescribed Secretory Cavity Type in Leaves of *Eupatorium rugosum* (Compositae).
- 8:45 27. Herr, J. M., Jr. (University of South Carolina). Permanent Preparations of Root and Stem Sections Treated with Hydrochloric Acid-Phloroglucin.
- 9:00 28. Martin, Ben F. and Shirley C. Tucker. (Louisiana State University at Alexandria and Louisiana State University). Shoot Tip Abortion in *Smilax*.

Invertebrate Zoology, Session I—UC 310G

Presiding: *Dr. W. D. Longest*, University of Mississippi.

- 8:00 29. Vidrine, Malcolm F. and R. E. McLaughlin. (Jefferson Davis Parish Mosquito Abatement District No. 1 and USDA-ARS Gulf Coast Mosquito Research Laboratory). Colonial Rotifers in Southwestern Louisiana Rice Fields.
- 8:15 30. Joy, James E. (Marshall University). *Chaetogaster limnaei* (Annelida: Naididae) in *Heliosoma trivolis* from Charles Fork Lake, W. Va.
- 8:30 31. Boullion, Thomas L. (Louisiana State University at Baton Rouge). The Ultrastructure of the Setae and Setal Sac of *Enchytraeus albidus* (Annelida: Oligochaeta).

- 8:45 32. Welch, Kenneth J. (Marshall University). Growth Rates of the Asiatic Clam, *Corbicula fluminea* (Müller), in the Kanawha River, WV.
- 9:00 33. Murphree, Charles S. (Middle Tennessee State University). Scanning Electron Microscopical Study of Cuticular Features of Selected Arachnid Taxa.
- 9:15 BREAK
- 9:45 34. LaSalle, Mark W. and Armando A. De La Cruz. (Mississippi State University). Notes on the Life History of the Funnel Web Spider *Agelenopsis barrowsi* (Gertsch) in a Mississippi Brackish Water Marsh.
- 10:00 35. Huner, Jay V. (Southern University and University of Kuopio, Finland). Asphyxiation in Warmwater and Coolwater Crayfishes.
- 10:15 36. Vidrine, Malcolm F. (Jefferson Davis Parish Mosquito Abatement District No. 1). *Viet-satax*, Genus or Subgenus?

Plant Systematics, Session I—UC 310H

Presiding: *Dr. Charles R. Werth*, College of William and Mary.

- 8:00 37. Manhart, James R. (University of Georgia). Cytology of *Carex purpurifera* Mack.
- 8:15 38. Jones, Ronald L. (Eastern Kentucky University). A Comparison of *Aster* Sections: *Brachyphylli*, *Grandiflori*, and *Patentes*.
- 8:30 39. Bell, John M. and James W. Hardin. (North Carolina State University). The Morphology and Variation of Foliar Glands of the Betulaceae of the Eastern United States.
- 8:45 40. Cantrell, G. J., Jr. (Vanderbilt University). Micro-morphological Studies of *Aureolaria* Raf. species.
- 9:00 41. Poston, Muriel and Stanwyn G. Shetler. (Howard University and Smithsonian Institution). Systematic Importance of Seed Surface Features in *Caiophora* (Loasaceae Sub-Family Loasoideae).
- 9:15 BREAK
- 9:45 42. Bell, C. Ritchie and Anne H. Lindsey. (University of North Carolina at Chapel Hill). Flower Color and Leaf Form Variation in *Oxypolis greenmanii* Math. & Const. and *O. filiformis* (Walt.) Britt. (Apiaceae).
- 10:00 43. Horn, Charles N. (University of Alabama). Anatomical Adaptations to the Aquatic Environment in the Pontederiaceae, Its Taxonomic Usefulness.
- 10:15 44. Johnson, George P. (North Carolina State University). The Foliar Trichomes of North American *Castanea*.
- 10:30 45. Coile, Nancy C. (University of Georgia). Comparison of Flavonoids in *Ceanothus microphyllus* Michaux and *C. americanus* L.

Animal Ecology, Session I—UC 310J

Presiding: *Dr. Gary A. Heidt*, University of Arkansas at Little Rock.

- 8:00 46. Huggins, James A. and Michael L. Kennedy. (Memphis State University). Geographic Variation in the Masked Shrew, *Sorex cinereus*.
- 8:15 47. Hamilton, Meredith J. and Gary A. Heidt. (Memphis State University and University of Arkansas at Little Rock). Microgeographic Variation in the Mexican Vole (*Microtus mexicanus*).
- 8:30 48. Rucker, Richard A. (Memphis State University). Density and Home Range of the Bobcat, *Felis rufus*, in Arkansas.
- 8:45 49. Tabatabai, Farrokh R. and Michael L. Kennedy. (Memphis State University). Movements of Raccoons, *Procyon lotor*, in Western Tennessee.
- 9:00 50. McDonald, Charles B. and Andrew N. Ash. (East Carolina University and Gardner-Webb College). Pocosins, Changing Wetlands in North Carolina's Coastal Plain.
- 9:15 BREAK

- 9:45 51. Ash, Andrew N. and Charles B. McDonald. (Gardner-Webb College and East Carolina University). Managing Wildlife in Fragmented Pocosins and Swamp Forests.
- 10:00 52. Leberg, Paul L. and George D. Baumgardner. (Memphis State University). Morphologic Variation in the Coyote, *Canis latrans*, in the Southern United States.
- 10:15 53. Lee, Robert M. III. (Memphis State University). Food Habits of the Coyote, *Canis latrans*, in Tennessee.
- 10:30 54. Van Den Bussche, Ronald A. (Memphis State University). Helminth Parasites of the Coyote, *Canis latrans*, in Western Tennessee.
- 10:45 55. Dundee, Dee S. (University of New Orleans). Slug Pests of Mexico and Central America.

Ichthyology and Herpetology, Session II—UC 310B & C

Presiding: *Dr. Stanley E. Trauth*, Southern Methodist University.

- 9:45 56. Schwartz, Frank J. and Nat B. Frazer. (Institute of Marine Sciences, University of North Carolina and Woods Hole Oceanographic Institution). Growth in Weight for Loggerhead Turtles, *Caretta caretta*, Reared in Captivity for 14 Years in North Carolina.
- 10:00 57. Congdon, Justin D., J. Whitfield Gibbons, and Judith L. Greene. (Savannah River Ecology Laboratory). Species Specific Biomass: A Comparison of Southern and Northern Turtle Communities.
- 10:15 58. Schwartz, Frank J. and Diane S. Carter. (University of North Carolina, Institute of Marine Sciences). Pipefish, *Syngnathus louisianae*, Rejected as Food by Loggerhead Turtles, *Caretta caretta*.
- 10:30 59. Miller, David E. (University of South Florida). Foraging and Natural History of an Estuarine Water Snake, *Nerodia fasciata compressicauda*.
- 10:45 60. Diller, Lowell V. and Richard L. Wallace. (Frostburg State College and University of Idaho). Comparative Aspects of the Reproductive Biology of Three Populations of Western Rattlesnakes (*Crotalus viridis*) in Northern Idaho.

Plant Physiology, Session I—UC 310F

Presiding: *Dr. Thomas L. Reynolds*, University of North Carolina at Charlotte.

- 9:45 61. Linthicum, Margaret L., William J. Vail, and Robert K. Riley. (Frostburg State College). Axenic Culture of an Endomycorrhizal Fungus—*Gigaspora margarita*.
- 10:00 62. Toman, Frank,¹ J. E. Leggett,² and J. L. Sims.² (Western Kentucky University¹ and University of Kentucky²). The Effects of Manganese Toxicity on CO₂ Exchange Rates and Ribulose 1,5 Biphosphate Carboxylase Activity in Burley Tobacco.
- 10:15 63. Ross, James W.,¹ Robert H. Suehisa,² Kenneth H. Kaneshiro,² and Harry Y. Yamamoto.² (Benedict College¹ and University of Hawaii²). The Addition of Monogalactosyldiacylglycerol to Chloroplasts: Effects on Some Photochemical Activities.
- 10:30 64. Reynolds, Thomas L. (University of North Carolina at Charlotte). Metabolism of Ribosomal RNA During Growth and Development of the Male Gametophyte of *Hyoscyamus niger*.
- 10:45 65. Taller, Barbara J.,¹ Norimoto Murai,² and Folke Skoog.² (Memphis State University¹ and University of Wisconsin-Madison²). Cytokinins in the Ribosomal RNA of Higher Plants.

THURSDAY AFTERNOON, APRIL 12

Plant Ecology, Session II—UC Ballroom

Presiding: *Dr. Jerry M. Baskin*, University of Kentucky.

- 1:30 66. Williams, John M. (Marshall University). Long Term Spatial Distribution of Major Forest Species.
- 1:45 67. Jones, Steven M. and Garry G. Haehnle, (Clemson University). Geographical Distribution of *Quercus oglethorpensis* Duncan.
- 2:00 68. Shotola, Steven J., Philip A. Robertson, and George T. Weaver. (Southern Illinois University). Structural and Compositional Changes from 1956–1983 in an Old-Growth Oak-Hickory Forest in Southwestern Illinois.
- 2:15 69. Callaway, Ragan M. and Edward E. C. Clebsch. (University of Tennessee, Knoxville). Prediction of Growth in Classified Forest Stands in the Western Great Smoky Mountains National Park.
- 2:30 70. Walker, Gary L. and Edward E. C. Clebsch. (University of Tennessee). The Ecology of Northern White Cedar, *Thuja occidentalis* L., in its Southern Disjunct Range.
- 2:45 71. Bayer, Paul E. and Joe E. Winstead. (Western Kentucky University). Phenotypic Differences in Populations of *Euonymus americanus* from the Central United States and Autecological Studies of this Species in a Deciduous Forest of Kentucky.
- 3:00 BREAK
- 3:30 72. Dyer, Keith W.¹ and J. Frank McCormick.² (University of Georgia, Savannah River Ecology Laboratory¹ and University of Tennessee²). Long Term Effects of Ionizing Radiation on a Pine Forest.
- 3:45 73. McLeod, Kenneth W. (Savannah River Ecology Laboratory). Nutrient Conservation in Fertilized Loblolly Pine Forests.
- 4:00 74. Udvig, Todd and G. T. Weaver. (Southern Illinois University). Effects of Pine Conversion on Acid Sensitive Soils.
- 4:15 75. Donovan, Lisa A.,¹ Gail L. Ridgeway,² and Kenneth W. McLeod.¹ (University of Georgia, Savannah River Ecology Laboratory¹ and Lake Superior State College²). Water Stress in Loblolly Pine in Response to Sludge Application.

Ichthyology and Herpetology, Session III—UC 310B & C

Presiding: *Dr. Steve T. Ross*, University of Southern Mississippi.

- 1:30 76. Lindquist, David G., M. Virginia Ogburn, W. Boyd Stanley, Herman L. Troutman, and Susan M. Pereira. (University of North Carolina at Wilmington). Utilization of Rubble-Mound Jetties by Fishes.
- 1:45 77. Timmons, Tom J. and W. E. Garrett. (Murray State University). Effectiveness of Residual Stumps as Fish Attractors in Aliceville Lake, Alabama–Mississippi.
- 2:00 78. Knight, Scott and H. R. Robinette. (Auburn University and Mississippi State University). Food Habits of Five Tombigbee River Fishes.
- 2:15 79. Ogburn, M. Virginia and David G. Lindquist. (University of North Carolina at Wilmington). Population Dynamics and Feeding Ecology of the Sheepshead, *Archosargus probatocephalus*.
- 2:30 80. Barclay, Lee A., Jr. (Tennessee Technological University and U.S. Fish and Wildlife Service). Summer Home Ranges of Five Cyprinid Fishes in an Upper Cumberland Plateau Stream, and Effects of Predation on Home Range Size.
- 2:45 81. Maurakis, E. G.,¹ A. F. Horne,² R. E. Jenkins,³ R. W. Watson,⁴ and W. S. Woolcott.² (The George Washington University,¹ University of Richmond,² Roanoke College,³ and United States Army⁴). The Effects of Stream Order on the Longitudinal Distribution of Fishes in the Rappahannock River, Virginia.

Aquatic Ecology, Session II—UC 310E

Presiding: *Dr. Jay V. Huner*, Southern University.

- 1:30 82. Sherrill, Philip A. (Middle Tennessee State University). A Survey of the Benthic Macro-invertebrates of Woods Reservoir, Tennessee.
- 1:45 83. Richardson, Lorenzo D.,¹ Eric L. Morgan,¹ and R. C. Young.² (Upper Cumberland Biological Station (Tech Aqua)¹ and U.S. Tennessee Valley Authority²). Fresh Water Mussels as Realtime Biosensors of Water Quality: Applications in Automated Biomonitoring.
- 2:00 84. LaSalle, Mark W. and John T. Morrow. (Mississippi State University). Effects of Salinity on the Larval Development of the Estuarine Snail *Neritina usnea* (Roding).
- 2:15 85. Tarter, Donald C., Lee O. Hartsock, Steve I. McBride, and Mark F. Sheridan. (Marshall University). Low pH Tolerance, Under Continuous-Flow Bioassay Conditions, of Hellgrammite Larvae, *Corydalus cornutus* L. (Megaloptera: Corydalidae).
- 2:30 86. Bishop, T. Dale and Mark W. LaSalle. (University of Georgia and Mississippi State University). Seasonal Abundance of Larval Diptera in Two Oligohaline Marsh Plant Communities in St. Louis Bay, Mississippi.
- 2:45 87. Tarter, Donald C. and Daniel K. Pettry. (Marshall University). The Relationship Between Body Size and Body Coloration of *Baetisca carolina* Nymphs in Panther Creek, Nicholas County, West Virginia (Ephemeroptera: Baetiscidae).

Parasitology, Session I—UC 310F

Presiding: *Dr. John P. Harley*, Eastern Kentucky University.

- 1:30 88. DeMont, David J. (North Carolina State University). *Alloglossidium renali* Font and Corkum, 1975 Infection in North Carolina Grass Shrimp, *Palaemonetes paludosus*.
- 1:45 89. Joy, James E. and Anita J. Pritchard. (Marshall University). *Ergasilus centrarchidarum* and *Achtheres micropteri* (Copepoda: Lernaeopodidae) from Largemouth and Spotted Basses in Beech Fork Lake, West Virginia.
- 2:00 90. Duobinis-Gray, Leon F. and Kenneth C. Corkum. (Louisiana State University). The Population Dynamics of Seven Species of Monogenetic Trematodes Parasitizing the Gills of *Lepomis macrochirus* (Raf.) in Southern Louisiana.
- 2:15 91. Stuart, Michael D. (North Carolina State University). A Preliminary Report on the Helminth Parasites of the Eastern Box Turtle, *Terrapene c. carolina*, in North Carolina.
- 2:30 92. Parker, James C. (North Georgia College). Surveillance of Gray Squirrel Parasitism in Northern Georgia.
- 2:45 93. Johnson, Sandra Strawbridge and Sharon Patton. (University of Tennessee). Serological Survey for Toxoplasma Antibodies in Raccoons of Cades Cove, Great Smoky Mountains National Park, Tennessee.
- 3:00 BREAK
- 3:30 94. Patton, Sharon and Sandra Strawbridge Johnson. (University of Tennessee). Preliminary Survey for Toxoplasma Antibodies in Dairy Goats.
- 3:45 95. Shoop, Wesley L. and Kenneth C. Corkum. (Louisiana State University). Pathway of Mesocercariae of *Alaria marcianae* Through the Mammary Glands of Lactating Mice.
- 4:00 96. Lindsay, David S.,¹ John V. Ernst,² William L. Current,¹ Barry P. Stuart,³ and T. Bonnor Stewart.⁴ (Auburn University,¹ U.S.D.A. Animal Parasitology Institute,² Mobary Chemical Corporation,³ and Louisiana State University⁴). Prevalence of Coccidian Oocysts from Sows Housed on Pastures in Alabama, Georgia, Louisiana, and Maryland.
- 4:15 97. Kasim, Ahmed A. and Yasir R. Shawa. (King Saud University, Riyadh, Saudi Arabia). Coccidia from Sheep (*Ovis aries*) in the Saudi Arabia.

Symposium I—UC 310G

Mississippi River Delta Lakes

Co-sponsored by the Southeastern Chapter of the Ecological Society of America and the Association of Southeastern Biologists. Organized by: *Charles M. Cooper*, ARS Sedimentation Laboratory, Oxford, MS and *Jerry C. Ritchie*, ARS Hydrology Laboratory, Beltsville, MD.

Presiding: *Drs. Jerry C. Ritchie and Charles M. Cooper.*

- 1:55 Introduction.
- 2:00 98. Grissinger, Earl H. (United States Department of Agriculture Sedimentation Laboratory). Evolution of Lakes in the Mississippi River Delta.
- 2:15 99. Thorne, Robert M. (University of Mississippi). Human Occupation of the Mississippi Alluvial Valley and its Impact on the Biotic Community.
- 2:30 100. Cooper, Charles M. (United States Department of Agriculture Sedimentation Laboratory). Primary and Secondary Productivity in Natural Lakes of the Mississippi River Delta.
- 2:45 101. Knight, Luther A., Jr. and Jack Herring. (University of Mississippi and Mississippi Department of Wildlife Conservation). Changes in the Fisheries of the Mississippi River Alluvial Plain.
- 3:00 BREAK
- 3:30 102. Ritchie, Jerry C. (USDA-ARS Hydrology Laboratory). Sediment Accumulation in Delta Lakes.
- 3:45 103. Price, Richard E. (U.S. Army Corps of Engineers, Vicksburg District). Analysis of Water Quality Management Using Historical Aerial Photography.
- 4:00 Discussion.

Plant Systematics, Session II—UC 310H

Presiding: *Dr. Robert Kral*, Vanderbilt University.

- 1:30 104. Nesom, Guy L.¹ and Vernon M. Bates.² (Memphis State University¹ and The Harvard University Herbaria²). A Phylogenetic Reconstruction of *Polygonella*.
- 1:45 105. McDearman, Will W. (Mississippi Museum of Natural Science). Systematics of *Zigadenus densus* and *Z. leimanthoides* and Phylogenetic Implications of Breeding Systems in the Veratracae.
- 2:00 106. Nesom, Guy L. (Memphis State University). Phylogeny of *Chaptalia* sect. *Chaptalia* and the Origin of *C. tomentosa*.
- 2:15 107. Horn, Charles N. (University of Alabama). *Zosterella* vs. *Heteranthera*, a Little Used Genus in the Pontederiaceae.
- 2:30 108. Matthews, James F. (University of North Carolina at Charlotte). Annual vs. Perennial—Classical Botany vs. Species Biology.
- 2:45 109. Post, Barbara J. (University of North Carolina at Charlotte). Species Biology of *Coreopsis latifolia* Michaux.
- 3:00 BREAK
- 3:30 110. Beckmann, Robert L. (North Carolina State University). The Pollination Biology of Two Naturalized Morning Glory Species. *Ipomoea coccinea* and *I. quamoclit*, in the Carolinas.
- 3:45 111. Mellichamp, T. Lawrence. (University of North Carolina at Charlotte). Pollination and Fruit Production in Conjur's Nut in North Carolina.
- 4:00 112. Werth, Charles R. (College of William and Mary). Genetic Variation in *Asplenium platyneuron* (L.) Oakes (Aspleniaceae).
- 4:15 113. Werth, Charles R.,¹ James L. Riopel,¹ and Nan W. Gillespie.² (University of Virginia¹ and Princeton University²). Genetic Uniformity in an Introduced Population of Witchweed (*Striga asiatica*) in the United States.

Animal Ecology, Session II—UC 310J

Presiding: *Dr. T. David Pitts*, University of Tennessee at Martin.

- 1:30 114. Hackney, Courtney and Carol S. Moorse. (University of North Carolina at Wilmington). Variations of Shell Morphology in the Carolina Marsh Clam, *Polymesoda caroliniana* (Bosc), Related to Environmental Factors.
- 1:45 115. Ritke, Mark E. (Memphis State University). A Preliminary Phylogenetic Analysis of the Flickers (*Colaptes*).
- 2:00 116. Sibley, Steven C. (Mississippi State University). Effect of Habitat Structure on Nest Height in the Least Flycatcher.
- 2:15 117. Paterson, Robert L. (Frostburg State College). Geographic Variation in the Nest Sites of Black-throated Blue Warblers.
- 2:30 118. Willig, Michael R. (Texas Tech University and The Center for Energy and Environment Research of The University of Puerto Rico). An Experimental Analysis of Optimal Foraging Theory in *Lamponius portoricensis* from Puerto Rico.
- 2:45 119. Lewis, Patricia H. (Wesleyan College). Vegetational Survey of the Foraging Habitat of Baboon Hybrids of *Papio anubis* and *Papio hamadryas*, Awash River, Central Ethiopia.

FRIDAY MORNING, APRIL 13

Plant Ecology, Session III—UC 310B & C

Presiding: *Dr. Kenneth W. McLeod*, Savannah River Ecology Laboratory.

- 8:45 120. Baskin, Jerry and Carol C. Baskin. (University of Kentucky). Rock Outcrop Endemics of Unglaciated Eastern United States: An Hypothesis on the Role of the Light Requirement in their Narrow Endemism.
- 9:00 121. Busing, Richard T. and Edward E. C. Clebsch. (University of Tennessee). Species Composition and Species Richness of First-Year Old Fields in Northern Florida.
- 9:15 122. Bowers, Lynne Jordan. Winter Anomalies and Summer Drought in the Eastern U.S.: Do They Affect Forest Ecology and Mensuration Studies?
- 9:30 BREAK
- 10:00 123. Dyer, Keith W. (Savannah River Ecology Laboratory). Community Change Two Decades Following a Catastrophic Ice Storm in the Marshall Forest Preserve of Northwest Georgia.
- 10:15 124. Stalter, Richard. (St. John's University). The Impact of Defoliation by Gypsy Moths on the Forest at Greenbrook Sanctuary, New Jersey.
- 10:30 125. Hartsock, Lee O. and Stanley W. Ash. (Marshall University). An Anatomical Comparison of the Xeromorphy of Selected Species Representing Differing Hydrophytic Types.
- 10:45 126. Harper, Jill H. and Robert Stewart. (Delta State University). A Study of Self-Compatibility, Pollination, and Seed in *Sarracenia alata* (Wood).

Ichthyology and Herpetology, Session IV—UC 310E

Presiding: *Dr. Frank J. Schwartz*, University of North Carolina Institute of Marine Sciences.

- 8:00 127. Ditty, Jim G. and Frank M. Truesdale. (Louisiana Department of Wildlife and Fisheries and Louisiana State University). Ichthyoplankton Surveys of Nearshore Gulf Waters Off Louisiana: January–February and July, 1976.
- 8:15 128. Feeman, Joe C. and Charles F. Saylor. (Tennessee Valley Authority). Findings from Eight Tennessee Valley Streams.

- 8:30 129. Thompson, B. A.,¹ W. W. Forman,² and L. A. Deegan.¹ (Louisiana State University¹ and Freeport Sulphur Co.²). Fishes of Louisiana's Mississippi River Deltaic Plain Estuaries.
- 8:45 130. Ditty, James G. (Louisiana Department of Wildlife and Fisheries). Seasonality of Sciaenids in the Northern Gulf of Mexico.
- 9:00 131. LeGrande, William H. (University of Wisconsin-Stevens Point). Karyology of Three Rare Madtoms, Genus *Noturus*, from the Southeastern U.S.
- 9:15 132. Falls, R. K. and W. S. Woolcott. (University of Richmond). An Electrophoretic Comparison of Gene Loci in *Etheostoma nigrum* and *Etheostoma olmstedii* from the James River Drainage, Virginia.

Parasitology, Session II—UC 310F

Presiding: *Dr. Sharon Patton*, University of Tennessee.

- 8:00 133. Marbury, Kenny, J. C. Williams, and Sara W. Scheide. (Louisiana State University). Hypobiotic Changes in *Ostertagia ostertagi* During Environmental Adaptation.
- 8:15 134. Kyle, Dennis E. and Gayle P. Noblet. (Clemson University). Distribution of Small Free-living Amoebae in Benthic, Planktonic and Neustonic Habitats.
- 8:30 135. Bone, Leon W. and Kurt P. Bottjer. (Regional Parasite Laboratory, USDA). Cuticular Carbohydrate and Chemoreception in Some Nematodes.
- 8:45 136. Stringfellow, Frank and Raymond H. Fetterer. (Animal Parasitology Institute, Beltsville, MD). In Vivo Cultivation of Parasitic Nematodes and Drug Resistance.
- 9:00 137. Bottjer, Kurt P. and Leon W. Bone. (Regional Parasite Research Laboratory, USDA). Effects of Some Biological Compounds on In Vitro Feeding of *Trichostrongylus colubriformis*.
- 9:15 138. Kramer, J. D. and B. J. Bogitsh. (Vanderbilt University). A Biochemical Study of Acid Dipeptidyl Aminopeptidase Activity in Schistosomes.
- 9:30 BREAK
- 10:00 139. Mobley, Ronald W., Grover C. Miller, and John F. Roberts. (North Carolina State University). A Preliminary Survey of Monoclonal Antibody Production Against Schistosomula of *Schistosoma mansoni*.
- 10:15 140. Toole, Joseph E. and Kenneth C. Corkum. (Louisiana State University). A TEM Comparison of the Tegument of *Spirometra mansonoides* (Cestoda: Pseudophyllidae) from Endo- and Ecto-thermic Hosts.
- 10:30 141. Bogitsh, B. J. (Vanderbilt University). A Light and Electron Microscopic Study of Acid Proteases in *Haematoloechus medioplexus* Gut.
- 10:45 142. Antonios, Sanaa N. (Tanta Faculty of Medicine, Egypt). The Effect of Sex of Experimental Host on the Infection with *Schistosoma mansoni* and *Schistosoma haematobium*.

Cryptogamic Botany, Session I—UC 310G

Presiding: *Dr. Terry W. Hill*, Southwestern at Memphis.

- 8:45 143. Doyle, Michael F. and Barbara A. Roy. (Southern Illinois University at Carbondale). A Preliminary Report on Hawaiian Agaricales.
- 9:00 144. Sundberg, Walter J. (Southern Illinois University at Carbondale). *Lepiota helveola* Bres. sensu lato—A Toxic Mushroom New to Illinois and Kentucky.
- 9:15 145. Renzaglia, Karen S. and Marie L. Hicks. (East Tennessee State University and Appalachian State University). *Megaceros* (Anthocerotae) in the Southern Appalachians.
- 9:30 BREAK
- 10:00 146. Bowers, Frank D. (University of Wisconsin-Stevens Point). A Comparison of Bryophyte Species from Different Bog Sites in the Maritime Provinces of Canada and Great Lake Region Bogs.
- 10:15 147. Reese, William D. (University of Southwestern Louisiana). Range and Reproduction in *Syrphopodon texanus* Sull. (Musci), a North American Endemic.

- 10:30 148. Varney, D. R.,¹ M. R. Siegel,² M. C. Johnson,² W. C. Nesmith,² R. C. Buckner,² L. P. Bush,² P. B. Burrus II,² and T. A. Jones.² (Eastern Kentucky University¹ and University of Kentucky²). Incidence and Dissemination of the Endophytic Fungus, *Epichloe typhina*, in Tall Fescue, *Festuca arundinacea*.
- 10:45 149. Beckelhimer, Steve L. and Thomas E. Weak. (Marshall University). The Effects of Flooding of a Small Stream on Lichens Occurring on *Acer saccharinum* L.

Plant Systematics, Session III—UC 310H

Presiding: *Dr. T. Lawrence Mellichamp*, University of North Carolina at Charlotte.

- 8:45 150. Hardin, James W. (North Carolina State University). *Quercus* of the Southeastern United States.
- 9:00 151. Smith, Arlo I. (Southwestern at Memphis). The Scarlet Woodbine, *Schisandra coccinea* Michaux in Tennessee.
- 9:15 152. Coffey, Janice C. (St. Mary's College). Endangered, Threatened, and/or Rare Juncaceae of the United States.

Symposium II—UC 310J

Selected Conservation Issues in West Tennessee

Co-sponsored by the Southeastern Chapter of Ecological Society of America and the ASB Conservation Committee.

Presiding: *Dr. Frank P. Day, Jr.*, Old Dominion University.

- 7:55 Smith, Wintfred L. (University of Tennessee at Martin). Introduction.
- 8:00 153. Eager, Dan. (Tennessee Natural Heritage Program). An Overview of Rare Species in West Tennessee.
- 8:30 154. Hatcher, Robert M. (Tennessee Wildlife Resources Agency). Eagle Restoration in Tennessee.
- 9:00 155. Doyle, Larry M. and Richard L. Lowe. (Tennessee Valley Authority). Resource Management at Land Between The Lakes.
- 9:30 BREAK
- 10:00 156. Zerfoss, Frank. (Tennessee Wildlife Resources Agency). The Hatchie River: An Overview of Natural Resource Management Problems.
- 10:30 157. Smith, Wintfred L. (University of Tennessee at Martin). Reelfoot Lake: Its History, Development, and Management.

Ichthyology and Herpetology, Session V—UC 310B & C

Presiding: *Dr. Michael V. Plummer*, Harding University.

- 10:00 158. Asquith, Adam. (Mississippi State University). Developmental Patterns of Salamander Larvae.
- 10:15 159. Howard, James H., Richard L. Raesly, and Edward L. Thompson. (Frostburg State College, Horn Point Environmental Laboratory, and Maryland Natural Heritage Program). Genetic Isolation in Cave Populations of the Spring Salamander, *Gyrinophilus porphyriticus*, from West Virginia.
- 10:30 160. Pechmann, Joseph H. K. and Rebecca L. Schneider. (Savannah River Ecology Laboratory). The Spatial Distribution of Migrating Amphibians Around a Breeding Site.
- 10:45 161. Trauth, Stanley E. and Wayne R. Fagerberg. (Southern Methodist University). Morphometric Analysis of Eggshell Structure in the Lizard *Cnemidophorus sexlineatus*.

Special Session—UC 310H

Problems in Southeastern Herbaria

A Forum for Curators and Users Convened by Nancy Coile, University of Georgia; Cindy Aulbach-Smith, University of South Carolina; Jimmy Massey, University of North Carolina—Chapel Hill; and Jim Matthews, University of North Carolina—Charlotte.

Presiding: *Dr. Jimmy R. Massey.*

10:00 Open Discussion.

FRIDAY AFTERNOON, APRIL 13

Plant Ecology, Session IV—UC 310B & C

Presiding: *Dr. Joe E. Winstead*, Western Kentucky University.

- 1:30 162. Feiertag, James A.,¹ G. Ronnie Best,¹ and Timothy P. King.² (University of Florida¹ and Florida Game and Fresh Water Fish Commission²). Survival and Growth of Woody Plant Seedlings Planted on Reclaimed Phosphate Strip-Mined Lands.
- 1:45 163. Parr, Patricia Dreyer and George E. Taylor, Jr. (Oak Ridge National Laboratory). Influence of Relative Humidity in Modifying Plant Response to Trace Sulfur-Containing Gases.
- 2:00 164. Winstead, Joe E. and Frank R. Toman. (Western Kentucky University). Mineral Uptake and Accumulation by Differentiated Populations of *Andropogon virginicus* L. Surviving on Abandoned Coal Strip Mines.
- 2:15 165. Brown, Charles W., C. John Burk, and H. Allen Curran. (Smith College). Palynological Analyses of a Dated Peat Core from the North Carolina Outer Banks.
- 2:30 166. Dalton, Barry R., Sterling B. Weed, and Udo Blum. (North Carolina State University). The Effectiveness of Sterile Soils in Altering the Recovery of Vanillic Acid.
- 2:45 167. Shann, Jodi and Udo Blum. (North Carolina State University). Depletion of Ferulic Acid, an Allelopathic Compound, by Roots of Cucumber Seedlings.
- 3:00 BREAK
- 3:30 168. Blum, Udo, Barry R. Dalton, and John O. Rawlings. (North Carolina State University). Effects of Ferulic Acid and Some of its Microbial Metabolic Products on the Radicle Growth of Cucumber Seeds.
- 3:45 169. Middendorf, George A. and Muriel E. Poston. (Howard University). Fruiting Phenology in Raspberries: Energy Availability and Implications for Frugivore Foraging Strategy.
- 4:00 170. Pinder, J. E., A. C. Doswell, D. C. Adriano, T. G. Ciravolo, and D. M. Yehling. (Savannah River Ecology Laboratory). Interception and Retention of Pu-238 by Orange Trees, *Citrus sinensis*.

Animal Physiology, Session I—UC 310E

Presiding: *Dr. Dennis A. Baeyens*, University of Arkansas at Little Rock.

- 1:30 171. Huey, David W.,¹ Donald E. Watenpaugh,² and Thomas L. Beitinger.² (Louisiana State University at Alexandria¹ and North Texas State University²). Nitrite Exposure Influences the Critical Thermal Maximums of Channel Catfish.

- 1:45 172. Snellgrove, Richard L., Kenneth B. Davis, and Bill A. Simco. (Memphis State University). Sex Reversal in Channel Catfish, *Ictalurus punctatus*.
- 2:00 173. Gordon, Bonnie K. (Memphis State University). Anatomical and Physiological Maturation of Extra-testicular Newt Sperm.
- 2:15 174. Mason, Philip J. (Berry College). Aspects of the Reproductive Physiology of the Male American Woodcock (*Philohela minor* Gmelin) in Alabama.
- 2:30 175. Lamoreaux, William J. and P. S. Rushton. (Memphis State University). Circadian Pattern of Transferrin in *Mus musculus*.
- 3:00 BREAK
- 3:30 176. Bonner, James C. and Marion R. Wells. (Middle Tennessee State University). Acute Toxicity of p,p'-DDT, p,p'-DDD, and p,p'-DDE to the Freshwater Planaria (*Phagocata gracilis*).
- 3:45 177. Vigh, D. A. and M. Fingerman. (Tulane University). Molt Staging in the Fiddler Crab, *Uca pugilator*.

Cryptogamic Botany, Session II—UC 310G

Presiding: *Dr. Walter J. Sundberg*, Southern Illinois University at Carbondale.

- 1:30 178. Miller, Charles E. and Daniel P. Dylewski. (Ohio University and Virginia Polytechnic Institute and State University). The Fine Structure of *Ligniera verrucosa*, an Endoparasite of *Veronica persica*.
- 1:45 179. Warrington, Sarah J., H. Delano Black, and Lewis B. Coons. (Memphis State University). Methods of Entry of *Pisolithus tinctorius* (Pers.) Coker and Couch Hyphae into *Pinus taeda* L. Short Roots.
- 2:00 180. Neiswender, John B., H. Delano Black, and Neil A. Miller. (Memphis State University). Native Ectomycorrhizal Fungi and the Growth of Outplanted *Pinus taeda*.
- 2:15 181. Walker, Alice M., Lafayette Frederick, and W. Lena Austin. (Howard University). Rib Formation in Ascospores of *Neurospora crassa*—Confirmation of the Presence of Intraspore Membrane Plaques.
- 2:30 182. Reaves, Jimmy L. and John E. Mayfield. (Atlanta University). Effects of *Trichoderma viride* Filtrates on *Armillaria mellea* in Liquid Culture.
- 2:45 183. Fredrick, L., W. Lena Austin, and Antonia Wilford. (Howard University). A Natural Mutant of *Neurospora dodgei* that Forms Asci with 8 to 16 Round or Peanut-Shaped Ascospores.

Cytology and Genetics, Session I—UC 310H

Presiding: *Dr. B. R. Jones*, Southwestern at Memphis.

- 1:30 184. Faulkner, Lee E., Charles J. Biggers, and Harold R. Bancroft. (Memphis State University). Analysis of Esterase II Gene Frequencies of *Anthonomus grandis* of Western Tennessee.
- 1:45 185. Conner, George W. and George B. Saul. (Loyola College and Middlebury College). Acquisition of Cross Incompatibility by Wild-Type Stocks of *Mormoniella*.
- 2:00 186. Flint, Kimberly B. and J. P. O'Neill. (University of Tennessee—Oak Ridge Graduate School of Biomedical Sciences and Oak Ridge National Laboratory). X-Irradiation and Cell Cycle Specificity.
- 2:15 187. Boullion, Karen J. and Russell L. Chapman. (Louisiana State University, Baton Rouge). Application of Light-Dark Regimes to the Study of Cytokinesis and Karyokinesis in *Trentepohlia* sp. and *Cephaleuros virescens* (Chlorophyta).
- 2:30 188. Tomsko-Twigg, Cynthia J. and James H. Howard. (Frostburg State College). An In Vivo Screening Procedure to Detect Point Mutations in Vertebrate Tissue.
- 2:45 189. Bath, Daniel W. (Austin Peay State University). Clonal Origin of a Human Malignant Melanoma: Evidence from a Marker Chromosome.

Cell and Molecular Biology, Session I—UC 310J

Presiding: *Dr. Betty I. Tarnowski*, St. Jude Children's Research Hospital.

- 1:30 190. Dute, Roland R. and John D. Weete. (Auburn University). Subcellular Changes During the Germination of *Aspergillus ochraceus* Conidia.
- 1:45 191. Artis, Deogratis E., Jerome P. Miksche, and Sukhraj S. Dhillon. (North Carolina State University). Cytochemical Comparisons Between Fertile and Sterile Soybean Genotypes.
- 2:00 192. Ryals, Phillip E. and Harriett E. Smith. (University of Alabama). The Effect of Vitamin K₁ on Microstome–Macrostome Transformation in the Ciliate, *Tetrahymena vorax*.
- 2:15 193. Morton, David and Bruce Gregory Chin. (Frostburg State College and Wright State University). Increase in the Chemotactic Activity of Rat Serum after Parenteral Administration of Iron.
- 2:30 194. Gartner, T. Kent,¹ Michael E. Dockter,² and Laura S. Grosmaire.¹ (Memphis State University¹ and St. Jude Children's Research Hospital²). Glucose and Galactose Specific Antibodies from Human Plasma.

Parasitology, Session III—UC 310F

Presiding: *Dr. R. A. Prudhon*, Shelby State Community College.

- 3:30 195. Upton, Steve J.,¹ Barry Haynes,¹ William L. Current,¹ and Susan M. Barnard.² (Auburn University¹ and Atlanta Zoological Park²). Development of *Caryospora simplex* in Human Embryonic Lung Cell Culture.
- 3:45 196. Speed, Jon C. (Appalachian State University). A Parasitological Study of Four Villages in Western Jamaica.
- 4:00 197. Lushbaugh, W. B.,¹ M. F. Hennington,¹ S. A. Pennick,² A. C. Turner,¹ and W. F. Hutchison.¹ (University of Mississippi Medical Center¹ and State Department of Health²). Endemic Giardiasis in Day Care Centers.
- 4:15 198. McDarby, Michael B., Lewis B. Coons, and Walter E. Wilhelm. (Memphis State University). Ultrastructural Morphology of *Capillaria catostomi* Pearce.

Teaching Biology, Session I—UC 310H

Presiding: *Dr. Robert L. Amy*, Southwestern at Memphis.

- 3:30 199. Mainwaring, H. R. and James H. Horton. (Western Carolina University). Producing Video Tapes for General Class Use.
- 3:45 200. Koch, William J. (University of North Carolina at Chapel Hill). Workshop: How to Incorporate Small Group Work Into Large Lecture Courses. (Duration: 1 hr.)

Microbiology, Session I—UC 310J

Presiding: *Dr. C. George Hollis*, Buckman Laboratories, Inc.

- 3:30 201. Dennis, Greg R. and Fred Hinson. (Western Carolina University). The Antimicrobial Effects of Flavanoids on Various Bacteria.
- 3:45 202. Mobley, Ronald W., Grover C. Miller, and John F. Roberts. (North Carolina State University). A Preliminary Study of Monoclonal Antibody Production Against Schistosoma of *Schistosoma mansoni*.
- 4:00 203. Ourth, Donald D. (Memphis State University). Lack of Bactericidal Humoral Immunity to *Serratia marcescens* by the Tobacco Budworm Larva, *Heliothis virescens*.
- 4:15 204. Grimm, Daniel T.,¹ C. George Hollis,² and Susan L. Turner.¹ (Memphis State University¹ and Buckman Laboratories²). Thermophilic Sulfate-Reducing Bacteria Isolated from a Kraft Paper Machine System.

Abstracts

ANDERSON, PEGGY B. and G. R. BEST. University of Florida—Mechanisms of recovery of woody plants in forested wetlands following burning.

Periodic fires are a major mechanism influencing long-term dynamics of plant community succession. A fire in a young forested wetland in Okefenokee Swamp, Georgia, occurring July 1981, allowed us to address 1) the response of a wetland community to fire, 2) the primary mechanisms for reestablishment and encroachment, and 3) differences in mechanisms between species, between size classes within species, and between life forms. Trees and shrubs were sampled in Fall 1981, 1982, and 1983 in both the burned wetland and an adjacent unburned control. Parameters recorded were as follows: 1. live, dead, or regrowth status of plant by species; 2. diameter (dbh) or height (if less than 1.3 m); 3. species and distance of nearest neighbor tree species; 4. distance from nearest unburned area; and 5. presence of resprouting, number and size of sprouts. Information has been recorded on about 700 trees and 1700 shrubs in the burned and control areas. Shrubs demonstrate a low resprout survival response at increasing distance from the unburned control. Large trees (greater than 45 cm dbh) show high survival and low resprout capabilities. Intermediate sized trees show a high resprout rate. *Taxodium* has slightly higher resprouting capabilities than *Nyssa*. They are both much more capable of resprouting than the other trees present (*Magnolia*, *Pinus*, *Gordonia*). *Persea* demonstrated large resprouting capabilities in spite of the fact that the original tree trunks were destroyed by fire.

ANTONIOS, SANAA N. Tanta Faculty of Medicine, Tanta, Egypt—The effect of sex of experimental host on the infection with *Schistosoma mansoni* and *Schistosoma haematobium*.

The effect of sex of the host on the migration and maturation of *Schistosoma* cercariae was investigated. Equal number of male and female laboratory - bred hamsters were infected with 500 cercariae of *Schistosoma mansoni* and the same number of animals were exposed to 400 cercariae of *S. haematobium*. The percentage recovery of worms and the length of male worms were calculated five weeks post infection in *S. mansoni* and nine weeks post infection in *S. haematobium*. The results showed that in each case the male animals gave a significantly higher percentage recovery of worms than the female. Moreover, the length and the number of male worms from male animals was greater than that of worms from female animals. These findings suggest that the sex of the host may influence the sexual balance of its worm population.

ARTIS, DEOGRATIS E., JEROME P. MIKSCHKE and SUKRAJ S. DHILLON. North Carolina State University—Cytochemical comparisons between fertile and sterile soybean genotypes.

Nodulated sterile, non-nodulated sterile, nodulated fertile and non-nodulated fertile soybean genotypes were developed. Changes in the DNA, RNA, and protein were measured cytophotometrically in trifoliolate leaflets at various days after emergence. The leaf tissue of fertile genotypes of nodulated as well as non-nodulated plants demonstrated similar curve profiles for DNA, RNA, and protein over the experimental period through leaf senescence. However, the leaf tissue of sterile genotypes of both nodulated and non-nodulated plants yielded DNA, RNA, and protein quantities that were significantly higher than those observed in the two fertile lines. It appears that reproductive structures of fertile plants utilized the molecules, whereas in sterile lines, the macromolecules accumulated. In fact, the accumulation process yielded DNA values beyond the 4C level.

ASH, ANDREW N. and CHARLES B. McDONALD. Gardner-Webb College and East Carolina University—Managing wildlife in fragmented pocosins and swamp forests.

Historically, pocosins of eastern North Carolina were not used for agriculture due to their wet, organic soils and impenetrable vegetation. Thus, they traditionally served as natural wildlife habitat. Recent development of these wetlands for agriculture has threatened wildlife populations. Sound wildlife management in eastern North Carolina is necessary to ameliorate effects of development and should be based on the following principles: 1. Eastern North Carolina should be managed comprehensively as a regional unit so that cumulative effects can be recognized and addressed. 2. A system of regional wildlife refuges is needed to provide sanctuary for some species and preserve large contiguous acreages of natural habitat. 3. Wildlife corridors should be left in newly developed agricultural areas to allow wildlife movement in a fragmented landscape. 4. Endangered species should be identified and located during development and their needs should be addressed as a matter of course on both public and private lands. 5. Regional water quality must be maintained in the face of land development and agricultural use of fertilizer and pesticide. 6. Edges of agricultural fields should be modified to support important game species by the appropriate placement of food, cover and water.

ASQUITH, AOAM Mississippi State University--Developmental Patterns of Salamander Larvae.

Twenty-five body measurements were taken on specimens in ontogenetic series of two ecological types of salamander larvae (pond-dwelling=*Ambystoma talpoideum* and *A. maculatum*; stream-dwelling=*Desmognathus* sp. and *Eurycea bislineata*). All larvae were old enough to be free-swimming but had not entered metamorphic climax. Linear regressions of the various measurements against snout-vent length were used to illustrate differences in growth patterns relative to inherent growth rates, ontogenetic shape changes, and ecological type of larva. Most plots showed high correlations, and ontogenetic shape changes were minimal.

BARCLAY, LEE A., JR. Tennessee Technological University, and U.S. Fish and Wildlife Service--Summer home ranges of five cyprinid fishes in an Upper Cumberland Plateau stream, and effects of predation on home range size.

Home ranges of 5 species of cyprinid fishes were studied in Blackburn Fork (tributary to the Cumberland River, Putnam and Jackson Counties, TN) during low-flow conditions in summer 1983. Under naturally occurring predator/prey conditions, *Notropis ardens* and *N. telescopus* occupied home ranges of 20m and 30m, respectively, in long pools, while *Camptostoma anomalum*, *Semotilus atromaculatus*, and *Rhinichthys atratulus* had home ranges of 60m, 40m, and 30m, respectively, which included both pool and riffle areas. When predators (*Micropterus dolomieu*, *Ambloplites rupestris*, *Lepomis cyanellus*, and *L. macrochirus*) were removed from these stream segments, *N. ardens* and *N. telescopus* expanded their home ranges to 30m and 50m, respectively; predator removal did not significantly affect home range sizes of the other 3 species. Reintroduction of predators into half of the pools caused *N. ardens* and *N. telescopus* to contract their home ranges back to their approximate original sizes, while both of these species in predator-free control pools retained the larger-sized home ranges throughout the remainder of the study period.

BASKIN, JERRY M. and CAROL C. BASKIN. University of Kentucky--Rock outcrop endemics of unglaciated eastern United States: An hypothesis on the role of the light requirement in their narrow endemism.

Within the unglaciated eastern U.S., endemic plant taxa occur on unshaded rock outcrops in shallow soil developed from serpentine, shale, granite, limestone, sandstone and chert. Many of the endemics are not restricted to a single type of geological substratum, and they grow well in non-outcrop soil. Thus, it seems unlikely that they are restricted to the outcrops because of a requirement for some chemical, physical or biological element

found there but nowhere else. Neither does lack of genetic variation per se seem to be the cause of endemism. An obligate requirement that the endemics have in common for growth and survival is high light intensity; this requirement previously has been proposed to play an important role in restricting them to the outcrops. However, ecophysiological mechanisms responsible for shade intolerance in the endemics have not been determined. We hypothesize that shading causes the photosynthetic apparatus of the endemics to become less efficient at low light intensities and that this is the cause of their shade intolerance. The effects of growth in a low light environment on the photochemical, biochemical and diffusion processes of photosynthesis, dark- and photorespiration and allocation of dry matter at the whole plant level are reviewed, and it is suggested that severe impairment of the growth process at one or more of these levels is the cause(s) of shade intolerance in the rock outcrop endemics.

BATH, DANIEL W. Austin Peay State University--Clonal origin of a human malignant melanoma: evidence from a marker chromosome.

Cytogenetic analyses of cultured cells from a human malignant melanoma revealed the presence of a marker chromosome. The abnormal chromosome was identified as an 11q+ translocation. The marker chromosome was observed in 67% of the cells in original cultures established from biopsy of the melanoma. Cytogenetic analyses of three cloned lines showed that the marker chromosome was present in over 70% of these cells. Cells from the four cultures were inoculated into athymic mice where they produced tumors in 2-4 weeks. An increase in the frequency of cells with the marker chromosome was observed in the tumors produced from each cell line. The consistent presence of the 11q+ translocation in the original cultures indicates a monoclonal origin of the melanoma. The increase in the frequency of cells with the marker following inoculation into mice also suggests a selective advantage for these cells in the malignant transformation.

BAYER, PAUL E. and JOE E. WINSTEAD. Western Kentucky University--Phenotypic differences in populations of *Euonymus americanus* from the central United States and autecological studies of this species in a deciduous forest of Kentucky.

Clinal patterns of increasing internode lengths and increasing leaf length x leaf width measurements of the dominant floor cover shrub *Euonymus americanus* were correlated with habitat of origin with more northern temperate populations showing lower or smaller values. Such measurements from

herbarium specimens provided indicators of five different physiographic areas with a correlation of growing seasons. Seed germination experiments indicate a possible shift of this species toward asexual reproduction and corresponding maintenance of high densities in the Western Mesophytic forests of Kentucky. Analysis of leaf tissues for Na and K ions by flame photometry show a possible phenological pattern of nutrient uptake.

BECKELHIMER, STEVE L. and THOMAS E. WEAKS. Marshall University--The effects of flooding of a small stream on lichens occurring on *Acer saccharinum* L.

Corticolous lichen communities were studied at three stations along the bank of a small stream that was subject to periodic inundation by floodwaters of the Ohio River. A paucity of lichen cover on trees was evident at stations and bole heights affected by flooding. Of all species observed, *Arthonia caesia* (Flot.) Korb. was found to be most resistant to factors associated with inundation and *Candelaria concolor* (Dicks.) B. Stein. the least resistant. Using step-wise discriminant analysis the amount of sediment on the tree boles was found to be the most important variable in separating the three stations and bole heights.

BECKMANN, ROBERT L. North Carolina State University--The pollination biology of two naturalized morning glory species, *Ipomoea coccinea* and *I. quamoclit*, in the Carolinas.

The two naturalized species, *I. coccinea* and *I. quamoclit*, set seed primarily by selfing. The more frequent visits of pollinating insects to flowers of *I. quamoclit* are correlated with greater nectar rewards in that species. Although these insects mediate intrafloral selfing, the necessity of these insects as pollen vectors is doubtful since seed production in bagged flowers is comparable to that of open-pollinated ones. Plant-pollinator relationships in both of these morning glories are fortuitous and of limited significance to either the plants or the predominant halictid pollinators.

BELL, C. RITCHIE and ANNE H. LINDSEY. University of North Carolina at Chapel Hill--Flower color and leaf form variation in *Oxypolis greenmanii* Math. & Const. and *O. filiformis* (Walt.) Britt. (Apiaceae).
Typical plants of the endemic *Oxypolis greenmanii*, with maroon petals and evergreen, coriaceous, cylindrical phyllodia, are easily separable from typical plants of *O. filiformis* which have white petals and oval, more

herbaceous and less persistent phyllodia. However, yellow-flowered mutants of *O. greenmanii* have been observed in the field and may have resulted in some misidentification of *O. greenmanii* as *O. filiformis*, or as intermediate hybrids between the two species. In addition, plants of *O. filiformis* with flattened leaves have been identified in the field as morphologically distinct from the typical *O. filiformis*; this may also be a cause of taxonomic confusion in the group. Preliminary reciprocal cross pollinations at the North Carolina Botanical Garden and observations of intermediate forms in field populations, indicate that *O. greenmanii* may hybridize with both the typical *O. filiformis* and the flattened-leaved form. Although hybrids are not common in the Apiaceae, the existence of putative hybrids in *Oxypolis* is not considered grounds for changing the taxonomic status of either species.

BELL, JOHN M. and JAMES W. HARDIN. North Carolina State University--The morphology and variation of foliar glands of the Betulaceae of the eastern United States.

Glandular trichomes occur on all leaves of the Betulaceae of the eastern United States. Fresh leaves as well as leaf samples removed from herbarium sheets were prepared for scanning electron microscopic observation. Foliar glands are of two forms: 1) capitate-sessile, 2) capitate-stalked. Members of the genus *Betula* possess only the capitate-sessile form while the other genera have capitate-stalked glands that vary greatly in size and shape. *Ostrya* and *Corylus* possess multiseriate stalks terminated by a multicellular secretory disc. Glands of *Alnus* and *Carpinus* are either uniseriate or biseriate, short (1-2 cells in length) stalks and also have a multicellular secretory disc. In all species glands occur on abaxial and adaxial surfaces, but more frequently on the abaxial surface. Laminar glands are usually situated above veins.

BISHOP, T. DALE and MARK W. LASALLE. University of Georgia and Mississippi State University--Seasonal abundance of larval Diptera in two oligohaline marsh plant communities in St. Louis Bay, Mississippi.

The seasonal abundance of the immature stages of four species of aquatic Diptera was studied in a low marsh dominated by *Juncus roemerianus* and a high marsh dominated by *Spartina cynosuroides* from June 1979 through March 1980. Seasonal patterns are reported for two species of *Culicoides* Latreille (Ceratopogonidae), and one species each of *Parophrosylus* Becker (Dolichopodidae) and *Ormosia Rondani* (Tipulidae). The species of *Culicoides* occurred in both marshes. The seasonal abundance of third and fourth instars, of each species, was similar with peak numbers occurring between October and April. In each marsh a different

species dominated. *Paraphrosylus* sp. also occurred in both areas but at higher densities in the *Spartina* marsh. Pupae as well as third and fourth instar larvae were present throughout the year with a peak of pupae in June. *Ormosia* sp. was largely restricted to the *Spartina* marsh with third and fourth instar density increasing between October and May with peak densities in November. Pupae occurred from May through September.

BLUM, UDO, BARRY R. DALTON and JOHN O. RAWLINGS. North Carolina State University--Effects of ferulic acid and some of its microbial metabolic products on the radicle growth of cucumber seeds.

Inhibition of radicle growth declined in a curvilinear manner over the 0 to 2 mM concentration range. At 0.125 and 0.25 mM concentrations of ferulic acid, radicle growth of cucumber was inhibited 7 and 14%, respectively. The concentration of ferulic acid in the petri dishes declined rapidly over the 48 hr of the bioassay. A variety of microbial metabolic products of ferulic acid were identified in the petri dishes and tested for toxicity. Only vanillic acid was as inhibitory as ferulic acid. The remaining phenolic acids were less inhibitory to non-inhibitory. When mixtures of phenolic acids were tested, individual components were antagonistic to each other in the inhibition of cucumber radicle growth. Depending on the initial total concentration of the mixture, effects ranged from 5 to 35% lower than the sum of the inhibition of each phenolic acid tested separately.

BOGITSH, B.J. Vanderbilt University--A light and electron microscopic study of acid proteases in *Haematoloechus medioplexus* gut.

The digestive tract of *Haematoloechus medioplexus* was investigated for the presence of cathepsin B, and dipeptidyl aminopeptidases I and II with light and electron microscope histochemical procedures. Amino acid derivatives of 4-methoxy-2-naphthylamide were used in all instances. Reaction product was observed at the light microscope level as discrete fluorescent granules in the gastrodermis. At the electron microscope level, reaction product was observed in large, membrane-limited inclusions in the gastrodermis. The role of these organelles in the digestive process will be discussed.

BONE, LEON W. and KURT P. BOTTJER. Regional Parasite Research Laboratory, USDA--Cuticular carbohydrates and chemoreception in some nematodes.

Cuticular carbohydrates of *Haemonchus contortus*, *Nippostrongylus brasiliensis*, and *Trichostrongylus colubriformis* were determined by labelling with fluorescein-conjugated lectins. Binding specificities indicated that N-acetyl-galactosamine and N-acetyl-

glucosamine were the predominant sugars of the cuticle of the three species. However, differences in lectin binding in body regions and the sexes were observed in the species of nematode. Additionally, glucose and mannose were found on the cephalic and caudal areas of male *T. colubriformis*, based on treatment with Concanavalin A (Con-A) and *Lens culinaris* agglutinin (LcA). Exposure of males of *T. colubriformis* to LcA reduced their subsequent locomotory response to female pheromone and ingestive response to histamine, based on *in vitro* assays. Thus, mannose residues may be involved in the sensory receptors for both sexual communication and feeding in this nematode.

BONNER, JAMES C. and MARION R. WELLS. Middle Tennessee State University--Acute toxicity of p,p'-DDT, p,p'-DDD, and p,p'-DDE to the freshwater planarian (*Phagocata gracilis*).

The purpose of this study was to evaluate the lethality of p,p'-DDT and its metabolites using a representative organism from an aquatic system. Acute toxicity studies were conducted to determine the LC₅₀ (mean lethal concentration) values for *Phagocata gracilis*. Planarians were treated with a series of test concentrations for each organochlorine insecticide, using acetone as the carrier solvent. In preliminary tests, planarians treated with sublethal concentrations were homogenized and the supernatant layer extracted. Samples were analyzed by gas chromatography. The results show that the insecticides were present in the tissue and that p,p'-DDT was converted to p,p'-DDE and p,p'-DDD. The toxicity tests indicate that p,p'-DDD is the most toxic, while p,p'-DDT is the least toxic. The ability of planarians to tolerate relatively high concentrations of p,p'-DDT suggests a problem of biological magnification in the environment.

BOTTJER, KURT P. and LEON W. BONE. Regional Parasite Research Laboratory, USDA--Effects of some biological compounds on *in vitro* feeding of *Trichostrongylus colubriformis*.

Numerous biological compounds were assayed for their effects on feeding by *Trichostrongylus colubriformis* *in vitro*. Dilutions of host bile or chyme had no effect on feeding as compared to controls. Likewise, 9 sugars and 13 amino acids had no effect when present at concentrations of 100 µg and 10 mg per ml. Biologically-active compounds, which have effects in various vertebrates and invertebrates, were tested over a range of dosages from 10⁻⁵ to 10⁻² M. These included cAMP, c-GMP, acetylcholine chloride, serotonin, histamine, GABA, norepinephrine, octopamine

and reduced glutathione. Most compounds had no effect. However, histamine and serotonin increased feeding by both sexes while octopamine decreased feeding by males, but not females. Thus, host compounds may partially modulate the feeding physiology of gastrointestinal nematodes.

Boullion, Karen J. and Russell L. Chapman, Louisiana State University, Baton Rouge, Louisiana --Application of light-dark regimes to the study of cytokinesis and karyokinesis in *Trentepohlia* sp. and *Cephaleuros virescens* (Chlorophyta).

The effects of light-dark (L:D) regimes on two genera of the green algal family Trentepohliaceae are being studied. The growth rates of *Trentepohlia* sp. and *Cephaleuros virescens* maintained on agar are different for any specific regime. A 14:10 L:D regime appears to support the most rapid growth rate for both algae. In algae maintained in liquid medium, the number of nuclei per cell and the mitotic stages of these nuclei have been monitored with epifluorescent microscopy and various fluorochromes. At the cellular level, responses to the same light regime are different in the two genera (grown in liquid medium). Synchronization of karyokinesis and cytokinesis have not yet been induced, but cross wall formation, which has not been observed previously, has been detected in asynchronously dividing vegetative cells. The goal of this work is to characterize cell division in vegetative cells of these two algae and recent results involving the concurrent use of several fluorochromes may allow further visualization of the processes of cytokinesis and karyokinesis. This research is being aided by a Grant-in-Aid of Research (awarded to the senior author) from Sigma Xi, The Scientific Research Society.

BOULLION, THOMAS L. Louisiana State University at Baton Rouge--The Ultrastructure of the Setae and Setal Sac of *Enchytraeus albidus* (Ann-elida: Oligochaeta)

The common white worm is a terrestrial oligochaete that is worldwide in distribution. The family Enchytraeidae, while mostly terrestrial, belongs to the aquatic order Haplotaxida. The setae and setal sac were examined using SEM and TEM to determine if the setal morphology and development are similar to that shown in previous works done on other oligochaete groups. SEM study reveals that the setae are simple, stout, and monomorphic; such setal morphology is apparently an adaptation for traction while burrowing, as can be seen in *Lumbricus terrestris*, the common earthworm. TEM study shows that the

seta is composed of a matrix penetrated by tubular, parallel, and longitudinal canals. An ultrastructural examination of the setal sac indicates that apparently all of the cells of the sac participate in the secretion of the seta. The microvilli of the basal cells of the sac seem to extend into the lumina of the setal canals during the secretion of the seta.

BOWERS, FRANK D. University of Wisconsin-Stevens Point--A comparison of bryophyte species from different bog sites in the Maritime Provinces of Canada and Great Lake region bogs.

A number of bogs were selected in the Maritime Provinces, Manitoba, Ontario, Wisconsin, and Minnesota for bryophyte collection. These were identified to species. The common *Sphagnum* species in the Maritime bogs were: *Sphagnum capillifolium* var. *tenellum*, *S. flavicomans*, *S. fuscum*, *S. imbricatum*, *S. magellanicum*, *S. pulchrum* and *S. tenellum*. In the bogs of the Great Lakes region common *Sphagnum* species were: *S. capillifolium*, *S. fuscum*, *S. magellanicum*, *S. papillosum*, and *S. recurvum* var. *brevifolium*. Non-sphagnum species such as *Dicranum*, *Aulacomnium*, *Polytrichum*, *Mylia*, and *Ptilidium* differed either in species component or relative abundance between the two areas. Hummock-hollow species also differed between the two areas.

BOWERS, LYNNE JORDAN.--Winter anomalies and summer drought in the eastern U.S.: do they affect forest ecology and mensuration studies?

Dendrochronology, or tree ring dating, detects the growth patterns which are common to a large number of trees over a wide geographic area. Below average tree growth, which is partially attributable to colder than normal winters and summer droughts, are evident throughout the south-eastern U.S. in the 1960's and 1977-82. Data to support this trend is presented. Specific studies from the literature which did not but perhaps should have taken this trend into consideration are reviewed.

BROWN, CHARLES W., C. JOHN BURK and H. ALLEN CURRAN. Smith College--Paly-nological analyses of a dated peat core from the North Carolina Outer Banks.

Paly-nological analyses and radiocarbon dating were performed on peat cores from Jeanette Sedge, an interdunal freshwater marsh in Buxton Woods, Hatteras Island, NC. Buxton Woods is situated on a series of dune ridges northwest of Cape Hatteras. Historical

accounts indicate that oaks were heavily logged in the area through the 1800's. Pinus taeda now exhibits near-total dominance of the canopy, with Quercus nigra, Q. virginiana, and Liquidambar styraciflua at low abundance. Elsewhere on the Outer Banks, Pinus taeda is also dominant in coastal forests but hardwoods are far better represented. Pollen data from the oldest dateable material from Jeanette Sedge indicate that around 895±155 yrs. B.P., Quercus was the prevalent woody taxon in the area, with Pinus in lesser amounts and Carya at very low abundance. Data from younger material indicate that the relative abundances of the major woody taxa remained fairly constant until European settlement (around 1700 A. D.) when Pinus began a marked increase and Quercus a marked decline. This work confirms that the modern dominance by Pinus taeda in Buxton Woods is a recent phenomenon resulting from human activities and suggests that the pre-Colonial forest resembled coastal forests now found elsewhere in the region.

BUSING, RICHARD T. and EDWARD E. C. CLEBSCH. University of Tennessee --Species composition and species richness of first-year old fields in northern Florida.

The responses of pioneer plant communities to season of soil disturbance were studied at Tall Timbers Research Station, Leon Co., Florida. Communities invading fields harrowed at different times of the year were dissimilar in composition and richness of species. Winter harrowing resulted in high cover of Ambrosia artemisiifolia, Crotalaria spectabilis and Richardia scabra. Spring harrowed fields had high cover of Cassia obtusifolia, C. spectabilis, Digitaria sanguinalis and R. scabra. Summer harrowed fields had high cover of Erigeron canadensis and R. scabra. Fall harrowed fields had high cover of C. spectabilis and E. canadensis. Campsis radicans and Rubus trivialis occurred in most of the fields regardless of harrowing date. Species richness was relatively low in the spring and early summer harrowed fields. The inability of perennial species to regenerate following soil disturbance in April or June was a cause of low species richness in these fields. Periodic regeneration and competitive interactions were responsible for the varying abundances of species among time of harrowing treatments. Unlike early successional communities in some regions, there was no consistently dominant annual species.

CALLAWAY, RAGAN M., and EDWARD E. C. CLEBSCH. University of Tennessee, Knoxville--Prediction of growth in classified forest stands in the western Great Smoky Mountains National Park.

Forest types were classified by TWINSpan and examined for soil, site, and stand growth relationships in the western Great Smoky Mountains National Park. Tree growth and site data were collected from 154 permanent plots

ranging from 450 to 1800 meters elevation. Twelve forest types were identified by TWINSpan. Indirect ordination using detrended correspondence analysis showed the groupings to have relatively distinct species composition. Discriminant analysis on species basal areas showed that over 96% of the samples were correctly classified. Discriminant analysis on environmental variables indicated overlap between forest types. Elevation and "protection" (related to moisture and temperature) were the major variables related to community distribution. "Protection" accounted for most of the variation among forest samples in regression equations developed to predict forest stand bole growth from environmental variables. More mesic conditions supported higher growth rates in species and stands. Past human disturbance complicated the prediction of growth.

CANTRELL, G.J., JR. Vanderbilt University--Micro-morphological studies of Aureolaria Raf. species. Aureolaria Raf. is a wholly North American genus of hemi-parasitic herbs. Manual and herbaria evidence an inconsistent application of the last taxonomic treatment by Francis W. Pennell. The objectives of this study are: 1) to further qualify characters, e.g., epidermal appendages and seed morphology, 2) to identify other such characteristics, and 3) to correlate this data with possible inter-specific relationships.

Light and electron microscopic analyses reveal more detailed surface features. New vestiture information includes the identification of discrete indument and gland morphologies and the presence of glands in the subgenus Aureolaria. Differences in reproductive structures, e.g., stigma shape and pollen- and seed-coat, are also documented. Data is included from the only known hybrid. Previously recognized taxa, i.e., subgenera and species, are supported though a few are not as well discerned. Supported in part by National Science Foundation grant SPI-8019192, the Biology Division of Oak Ridge National Laboratories, and the University of Tennessee Graduate School of Biomedical Sciences.

CLAYTON, JANET L. and R. DON ESTES. Tennessee Technological University--Larval and Young of the Year Fish Populations of Woods Reservoir.

Over the past few years, many unfavorable changes have occurred in Woods Reservoir, near Tullahoma, TN. A major concern has been the declining fisheries population. The purpose of this study was to collect and analyze data to delineate a possible cause and solution for the declining fisheries problem. The general goal was to assess the problem with emphasis on spawning success, spawning sites,

growth rates of young, mortality rates of young of the year, fish group comparisons and food habits of young. In order to accomplish these goals, three sampling methods were incorporated. These were larval fish tows, use of larval fish traps, and shoreline rotenoning. Upon preliminary analysis of the data collected, it appears that the spawning success of gizzard shad, the major forage fish, was very low. *Lepomis* spp. made up the largest percentage of larvae collected, with shad then being second. With analysis of shoreline rotenone data, *Lepomis* spp. again out numbered and out weighed the shad populations. Preliminary analysis of this data also showed few shad under 125mm with most ranging from 150-175mm. This project was jointly funded by Tennessee Technological University and the Tennessee Wildlife Resource Agency.

COFFEY, JANICE C. St. Mary's College--
Endangered, threatened and/or rare
Juncaceae of the United States.

Species of the rush genera *Juncus* and *Luzula* which are accorded status on Federal and state listings will be discussed with emphasis on the status of southeastern species. Distribution, habitat, aspects of species biology, taxonomic data, and historic considerations are the major concerns of the discussion.

COILE, NANCY C. University of Georgia--
Comparisons of flavonoids in *Ceanothus*
microphyllus Michaux and *C. americanus* L.

Chemical constituents are little known in the genus *Ceanothus*. *Ceanothus microphyllus* Michaux, restricted to south Alabama, north and central Florida and south Georgia, is a shrubby species of dry sandy soils in the longleaf pine-scrub oak communities. Bulk samples of specimens from all three states have been analyzed for flavonoid compounds and these results will be compared with the flavonoids obtained from herbarium specimens of *C. microphyllus* and to *C. americanus*. Flavonoid profiles obtained for 24 of the ca. 58 species in the genus reveal strong similarities between *C. microphyllus* and *C. americanus*, with one compound apparently unique to these species.

CONGDON, JUSTIN D., J. WHITFIELD GIBBONS,
and JUDITH L. GREENE. Savannah River
Ecology Laboratory--Species specific
biomass: a comparison of southern and
northern turtle communities.

Turtles comprise an important part of the vertebrate fauna of many northern and southern aquatic habitats. Because turtles are long-lived and have relatively large body sizes, they represent a large portion of the standing crop biomass of vertebrates in some aquatic systems. Biomass of each of

six species that occurred in a turtle community on the Savannah River Plant in South Carolina was calculated from data collected during a 16 year mark-recapture study. The species were *Pseudemys scripta*, *Pseudemys floridana*, *Deirochelys reticularia*, *Kinosternon subrubrum*, *Sternotherus odoratus*, *Chelydra serpentina*. Biomass of each of three species that occurred in a turtle community on the University of Michigan's E. S. George Reserve was calculated from data collected during a 9 year mark-recapture study. The species were *Chrysemys picta*, *Chelydra serpentina*, and *Emydoidea blandingi*. Turtle biomass was compared from a Carolina Bay and a farm pond in South Carolina, and for a typical marsh and a pond in southern Michigan. Biomass of the numerically dominant species (*P. scripta*) in the South Carolina community was similar in both the Carolina Bay (29.7 kg/ha) and the farm pond (29.3 kg/ha). The biomass of the numerically dominant species in the Michigan community in typical marsh habitat was (11.2 kg/ha). Preliminary analysis indicates that the total biomass/ha of the southern turtle community is substantially higher than the total biomass of the northern turtle community.

CONNER, GEORGE W. and GEORGE B.
SAUL, 2ND. Loyola College and
Middlebury College--Acquisition
of cross incompatibility by wild-
type stocks of *Mormoniella*.

In the wasp *Mormoniella*, the "normal" sex ratio in reciprocal crosses is about 80% females: 20% males. For 27 years, certain mutant stocks (e.g. tinged-277, peach-333) have exhibited non-reciprocal cross incompatibility. Mutant females produced very few or no daughters when outcrossed with wild-type or different mutant stocks. The reciprocal crosses gave the normal sex ratio. Although wild-type stocks have not shown this behavior in the past, new data demonstrate the acquisition of incompatibility by at least 5 wild-type stocks maintained by the *Mormoniella* Stock Center at Middlebury College. The stocks involved are Ithaca (New York) +, Woods Hole (Massachusetts) +, Macomb (Illinois) +, Belleville (Canada) +, and Cambridge (England) +. Leiden (Holland) + seems to be free from the phenomenon. The incompatibilities range from partial to complete, depending upon the source of the male parents. Similar incompatibilities have been described in crosses between natural populations of *Culex pipiens* and *Drosophila paulistorum*. Infectious cytoplasmic agents seem to be implicated in each instance. The changes occurring in the laboratory populations of *Mormoniella* appear to be causing patterns of reproductive isolation similar to those which have developed in the natural populations of the other species.

COOPER, CHARLES M. United States Department of Agriculture Sedimentation Laboratory--Primary and secondary productivity in natural lakes of the Mississippi River delta.

Oxbow lakes and river cutoffs form the largest natural component of lentic waters in the southern United States. Hundreds of oxbow lakes varying in size from less than one km² to over 20 km² are scattered on both sides of the lower half of the Mississippi River. When formed, these lakes generally had small watersheds except during overbank flooding of the Mississippi River or major tributaries. Extensive land use changes from forestry to intensive agriculture, accompanied many times by watershed enlargements through channelization, have dramatically changed the character of most delta oxbow lakes. In addition, flood control measures, including levee construction and channelization, have eliminated annual overbank flushing. Currently, annual primary productivity cycles in most oxbows are limited in spring and early summer by high suspended sediment loads, in summer and fall by phosphorus or nitrogen depletion, and in winter by low temperature. Chlorophyll maxima vary from less than 20 mg/m³ to over 150 mg/m³. Secondary productivity of macrobenthos is generally low, although it varies from less than 0.5 gm/m²/yr to more than 10 gm/m²/yr (including Mollusca). Benthos production is limited mainly by sediment deposition, lack of available habitat and desiccation during dry periods.

CURTIS, JOHN D. and NELS R. LERSTEN. University of Wisconsin-Stevens Point and Iowa State University--Development of a previously undescribed secretory cavity type in leaves of *Eupatorium rugosum* (Compositae).

Initiation of secretory cavity primordia occurs when the leaf is 2-4 mm long. Individual randomly scattered cells of the still-dividing mesophyll enlarge and form dense cytoplasm. Each initial cell divides to form two (sometimes three) approximately equal sized cells. The two cells become vacuolate next to the shared wall and an intercellular secretory space develops between and is completely ensheathed by the cells. The mature secretory structure, including the two epithelium cells and the cavity, has a diameter of 35 to 45 µm and is smaller and simpler than any previously described intercellular secretory cavity.

DALTON, BARRY R., STERLING B. WEED, and UDO BLUM. North Carolina State University--The effectiveness of steril soils in altering the recovery of vanillic acid.

Recovery studies were conducted with vanillic acid, a common allelopathic agent, using various sterile soil materials. Soil samples were collected from different horizons in the same profile and different sites varying in mineralogy and organic matter content. The initial concentration

of vanillic acid added to the soil materials was 1000 µg/g (5.945mmoles/g). The pH of the soil materials was adjusted and maintained at approximately 4.5 or 7.5. Samples were extracted with 0.03M Na₂EDTA (pH 7.5) at days 1,4,7, and 10 after the addition of vanillic acid. Concentrations of vanillic acid were determined with a high performance liquid chromatograph. No breakdown products were detected. Models were developed to describe the recovery of vanillic acid from the soil materials over time. The decrease in recovery of vanillic acid over time did not appear to be associated with any specifically identifiable soil component (Fe and Al hydroxides, clays, organic matter), since the substrates had similar impacts on the decline in the recovery of vanillic acid. The influence of the acrylic side chain of phenolic acids in adsorption/polymerization will be discussed.

DE LA CRUZ, ARMANDO A., AUGUSTUS MAMARIL and JAMES D. YARBROUGH. Mississippi State University--The role of aquatic weeds in maintaining surface water quality.

Three common aquatic weeds (*Lemna purpocilla*, *Ceratophyllum demersum*, and *Ludwigia palustris*) were exposed to radioactively labelled insecticides. These three plants readily assimilated the radio-insecticide within the first few hours of exposure, and up to about 20 µg/g after 96 hours in all the three weeds. Bioconcentration of DDT-¹⁴C, ENDRI-¹⁴C, and DDT-³H was greater for the submerged waterfern (*Ceratophyllum*) than for the floating duckweed (*Lemna*) and emergent alligator weed (*Ludwigia*). Exposure to ENDRI and DDT simultaneously or in series did not reveal any inhibition by, selection for, or stimulation due to one or the other insecticide. Microcosms containing water, sediment, and plants partitioned the insecticides either in decreasing order for the water or increasing order for sediment and plants. The sediment incorporated ENDRI at the same rate as *Lemna*, and one order of magnitude slower than *Ceratophyllum*. Aquatic weeds introduced in tanks containing contaminated sediment and reflooded with clean water were detected positive for radio-insecticide. Presence of very low level radioactivity in the clean medium holding labelled plants for as long as four days indicated only physical extraction of radio-insecticide adhering to plants' external surfaces and not active bioelimination from internal tissues. This ability of aquatic weeds to bioaccumulate radio-insecticide, concentrate it from extremely low level leachates, and hold it in their tissues is evidence of their value in cleaning surface waters of unwanted chemicals.

DEMONT, DAVID J. North Carolina State University--*Alloglossidium renali* Font and Corkum, 1975 infections in North Carolina grass shrimp, *Palaemonetes paludosus*.

Alloglossidium renali Font and Corkum, 1975 were found infecting antennary glands of freshwater grass shrimp in an oxbow lake

near the Neuse River in North Carolina in spring, 1982. Eggs from a single worm introduced into an uninfected 20 acre lake produced shrimp infections that spread throughout the lake within a single year. Encysted metacercariae were found in shrimp antennary glands on two occasions. Attempts to infect planorbid, lymnaeid and physid snails failed. Reexamination of Palaemonetes paludosus populations in Louisiana seems justified.

DENNIS, GREG R. and FRED HINSON.
Western Carolina University--The Antimicrobial Effects of Flavanoids on Various Bacteria.

It has been previously postulated that flavanoids play a role in defending plants from invading pathogens. This paper will present the antimicrobial effects of various flavanoid extracts on a variety of bacteria using the Kirby-Bauer antibiotic susceptibility test. The flavanoids to be tested were chosen according to their chemical structure and can be placed into one of the following four groups: Flavones, Flavonols, C-glycosylflavones and Isoflavones. The bacterial population that will be tested is just as diversified and possess unique characteristics. This group will attempt to represent the bacterial community and is listed below:

Bacillus subtilis- spore former
Staph aureus- human pathogen
Serratia marcescens- pigment prod.
Enterobacter aerogenes- soil org.
Mycobacterium smegmatis- acid fast
E. coli- enteric organism
Xanthomonas campestris- plant path.
Erwinia carotovora- plant path.
Erwinia amylovora- plant path.

The data for this project is currently being collected and will be available early in the year.

DILLER, LOWELL V. and RICHARD L. WALLACE.
Frostburg State College and University of Idaho--Comparative aspects of the reproductive biology of three populations of western rattlesnakes (Crotalus viridis) in northern Idaho.

Populations of Crotalus viridis from three hibernacula were examined. Certain reproductive aspects were common among the three populations. Mature males had spermatozoa in the vas deferens at all times of the year. Reproductive females emerged in spring with well developed ova of about 35 mm in length. Ovulation occurred from mid May to mid June, while parturition normally occurred during September. Males greater than 52 cm SVL and with four or more intact rattles were sexually mature. Most females greater than 55 cm SVL and with 5 or more rattles were sexually mature. Clutch size was highly correlated with female SVL. Other reproductive aspects varied among populations. Mean clutch size varied from 5.4 to 6.1.

Mean percentage of mature females reproducing annually varied from 55 to 77%. Visceral fat bodies were greater in one population than the other two. The population with the largest fat bodies also had the largest mean clutch size and highest mean percentage of females reproducing annually. We conclude that differences in feeding success, as evidenced by size of fat bodies, significantly alters the reproductive output of Crotalus viridis in these populations.

DITTY, JAMES G. Louisiana Department of Wildlife and Fisheries--Seasonality of sciaenids in the northern Gulf of Mexico.

Plankton samples were collected in waters off Caminada Pass using 61-cm bongo nets (0.363 mm) and meter nets (0.363 mm) in conjunction with monitoring of Louisiana Offshore Oil Port (LOOP) activities. Tows were at the surface for meter nets and near surface, mid and bottom depths for bongo nets. Sciaenids were characterized as either warm or cold-water spawners. Larvae occurred primarily between April-October for warm-water spawners and between November-March for cold-water spawners. This corresponded to mean surface water temperatures which were usually above 20°C in April and below 20°C in November. Spawning occurred from October-March in Micropogonias undulatus, from November-March in Leiostomus xanthurus and from December-April in Pogonias cromis. Spawning began in March for Cynoscion arenarius and in April for Stellifer lanceolatus, Bairdiella chrysura, Cynoscion nebulosus and Menticirrhus sp. Spawning extended through September in each species, except Menticirrhus sp., which were collected through November. Sciaenops ocellata were collected from August-October and both Cynoscion nothus and Larimus fasciatus from September-November. Two 'morphs' of C. arenarius were recognized but the taxonomic significance of this variation is uncertain.

DITTY, JIM G., AND FRANK M. TRUESDALE.
Louisiana Department of Wildlife and Fisheries, and Louisiana State University --Ichthyoplankton surveys of nearshore Gulf waters off Louisiana: January-February and July, 1976.

Samples were collected at stations in depths of 10-100m from the Mississippi River delta west to Atchafalaya Bay, using 61cm bongo nets (0.505mm). Tows were double oblique and sampled at least the upper one-half of the water column. At least 27 families were represented in samples from the winter cruise and 42 from the summer. Clupeids comprised 87% of all larvae taken in the winter and were followed in order of decreasing abundance by gobiids, bregmacerotids, stromateids, myctophids, and carangids. These families accounted for about 94% of the total larvae. Abundant species included Brevortia patronus; Etrurus teres; Bregmaceros spp.; Peprilus

burti; and *Trachurus lathamii*. Approximately 99% of *E. teres* and *T. lathamii* larvae were collected beyond the 30m contour. Engraulids comprised 61% of all larvae taken in the summer followed in order of decreasing abundance by carangids, gobiids, bregmacerotids, sciaenids and ehippids. The following species made up 81% of all larvae taken: *Anchoa* spp.; *Chloroscombrus chrysurus*; *Bregmaceros* spp.; *Cynoscion arenarius*; and *Chaetodipterus faber*. Approximately 95% of all *Chloroscombrus chrysurus*, *Cynoscion arenarius*, and *Chaetodipterus faber* larvae were collected inside the 25m contour.

DONOVAN, LISA A.,¹ GAIL L. RIDGEWAY,² and KENNETH W. MCLEOD.¹ University of Georgia, Savannah River Ecology Laboratory¹ and Lake Superior State College²--Water stress in loblolly pine in response to sludge application.

Litterfall in 10 yr old loblolly pine plantations fertilized with sewage sludge was found to be greater and begin earlier in the year as compared to litterfall in adjacent unfertilized plantations. This led to a hypothesis that the increased growth of the fertilized trees, both in height, diameter and amount of foliage, resulted in greater water stress which initiated the drop of needles early in the summer drought season. To test this hypothesis, seasonal and diurnal measures of xylem pressure potential were made to determine if water stress was occurring. Experimental variables included two types of soils and three levels of sludge application. Xylem pressure potential of individual needles was determined using the pressure chamber technique. Seasonal data indicated that trees on highly fertilized plots on clay soil were less stressed than those on control plots. Over the season there were no water stress differences due to sludge treatments on the sandy soils. Factors other than water stress were responsible for early litterfall in the fertilized plantations. These may include self-shading induced senescence or more rapid turnover of tissue due to the more fertile habitat.

DOYLE, LARRY M. and RICHARD L. LOWE. Tennessee Valley Authority--Resource Management at Land Between The Lakes.

The natural resources in Land Between The Lakes are being developed and managed to increase the recreation and environmental education opportunities for the public and to provide better wildlife habitat while improving the area aesthetically. Management efforts are principally designed to provide diversified habitats to support a wide range of both game and nongame wildlife populations; however, the system is sensitive to the protection and management of rare or unique ecosystems. Wildlife habitat is being improved through a variety of management practices including

development of woods openings, cover plantings, waterholes, food plantings, timber harvest, manipulation of successional stages, nest boxes, and others. This successful wildlife management program allows countless wildlife viewing opportunities as well as controlled hunting for deer, turkey, waterfowl, and a multitude of small game species.

DOYLE, MICHAEL F., and BARBARA A. ROY. Southern Illinois University at Carbondale--A preliminary report on Hawaiian Agaricales.

Apparently no comprehensive treatment on Hawaiian Agaricales exists; therefore a study of Hawaiian agarics has been initiated. The presence of 14 biogeoclimatic zones in Hawaii and the isolation of the islands make them ideal for study. To our knowledge, 26 agaric species in five families are known from Hawaii in the literature. Our preliminary herbarium and field observations and personal communications indicate an additional five families new to the islands with numerous new species records. The vascular plant flora consists of three components--native (derived from species capable of long distance dispersal), Polynesian (aboriginal introductions prior to European discovery in 1778), and exotic (post-1778, weedy-adventive or planted introductions). Many of the agaric species found in native ecosystems form small (often minute) basidiocarps. In contrast, fungi found in disturbed (Polynesian/exotic) environments tend to be larger. As expected, some agaric families are represented only in one type of vegetation component. The extent of undisturbed native vegetation and its agaric associates is being steadily reduced due to human land use pressures and competition by aggressive exotic species. Therefore, the native biota, including fungi, must be documented at the earliest possible date

DUNDEE, DEE S. University of New Orleans--Slug pests of Mexico and Central America.

Veronicellid slugs (Mollusca: Gastropoda: Pulmonata) have become a major problem throughout Mexico and Central America in the last three years. The species appears to have been introduced and, out of its native habitat, it now feeds on young bean plants. The slugs are exceedingly abundant and tend to eat the seed leaves before the plant can produce other leaves. Molluscicides, which are effective, are impractical because of the costs to the peasant farmers. The thrust of the research is to find a biological control. Three possible ones are under investigation: natural predators, a disease which we call "blistering phenomenon", Sciomyzid flies whose larval stages are parasitic in molluscs.

DUOBINIS-GRAY, LEON F. and KENNETH C. CORKUM. Louisiana State University--The population dynamics of seven species of monogenetic trematodes parasitizing the gills of *Lepomis macrochirus* (Raf.) in southern Louisiana.

Population dynamics were determined for *Actinocleidus fergusonii*, *Anchordiscus triangularis*, *Cleidodiscus nematocirrus*, *C. robustus*, *Urocleidus acer*, *U. dispar*, and *U. ferox* in diverse locations. All of these monogenetic trematodes parasitize *Lepomis macrochirus* (Raf.). The roles of various ecological and biological factors on the population dynamics of these parasites were analyzed.

DUTE, ROLAND R. and JOHN D. WEETE. Auburn University--Subcellular changes during the germination of *Aspergillus ochraceus* conidia. Ultrastructural changes in conidia of *A. ochraceus*, incubated at 26°C in a yeast-dextrose medium, were followed for 8-10 hours until germ-tubes were observed. With time, the spores swelled and clumped. Swelling was associated with the development of an inner cell wall layer which became the wall of the germ-tube. Aggregation coincided with the appearance of a halo of material around the spores. Prior to swelling, the plasmalemma was highly invaginated. These infoldings were mostly lost as the spore swelled. Other structural changes included the depletion of stored lipids; the breakdown of membrane-bound, electron-dense bodies; nuclear division; and changes in the appearance of the mitochondrial cristae. These results are now being correlated with changes in lipid metabolism in an effort to integrate form and function in the process of conidial germination.

DYER, KEITH W. Savannah River Ecology Laboratory--Community change two decades following a catastrophic ice storm in the Marshall Forest Preserve of Northwest Georgia.

A disclimax pine-oak hickory forest was examined in the 180-acre Marshall Forest Preserve in the Ridge and Valley Province of Northwest Georgia. The Marshall Forest has a record of cyclic catastrophic ice storms and a history of frequent fires. Ice storms and fire are thought to be responsible for the maintenance of the pine-oak disclimax. Results of this study are compared with results of a similar study twenty years earlier in order to determine changes in forest composition and dominants. Dominant oak and hickory species increased in importance while pine species decreased during the period 1961-1981. Increased importance of dominant hardwood species is a response to canopy openings created by ice damage to pine. Subcanopy species also increased

in importance as a consequence of ice damage to pines in the canopy. Decreased importance of pine species is a consequence of ice damage to canopy individuals and the effects of fire suppression upon regeneration. If current trends continue, an oak-hickory or mixed oak forest will dominate this site. A relatively greater increase in the importance of oak species favors the latter.

DYER, KEITH W.¹ and J. FRANK MCCORMICK². University of Georgia, Savannah River Ecology Laboratory¹ and University of Tennessee²--Long term effects of ionizing radiation on a pine forest.

In August, 1964 a twenty year study was initiated to determine the sensitivity of a pine forest to ionizing radiation. This was one of several studies designed to predict ecological consequences of nuclear war. A slash-longleaf pine forest was exposed to a 9200 Ci ¹³⁷Cs source for 200 hours. All trees which received in excess of 3000R died and growth was inhibited by exposures as low as 100R. One year following treatment it was concluded that the forest was more sensitive to radiation than any ecosystem previously studied, but recovery was proceeding rapidly. Some conclusions based upon initial short term responses were premature. Twenty years following treatment, very little recovery has occurred in lethally irradiated areas. Vegetation is similar to that expected three to four years following disturbance. Failure of this forest to recover from irradiation requires us to review earlier estimates of ecological effects of ionizing radiations and possible consequences of nuclear war. Results also confirm the importance of long term field studies when investigating effects of hazardous substances or other stresses upon ecological systems.

FALLS, R. K. and W. S. WOOLCOTT, University of Richmond--An electrophoretic comparison of gene loci in *Etheostoma nigrum* and *Etheostoma olmstedi* from the James River Drainage, Virginia.

Genetic variation of *Etheostoma nigrum* and *Etheostoma olmstedi* was analyzed with starch gel electrophoresis. There were three distinct populations. Nine loci encoding five enzyme systems and two loci encoding muscle proteins were examined in tissue homogenates. All populations were monomorphic with the exception of the esterase-3 (Est-3), phosphoglucotase (Pgm-1) and phosphoglucose isomerase (Pgi) loci. Two alleles of Est-3 exhibited activity in the homozygous and heterozygous conditions. Pgm-1 occurred as two alleles with a high degree of heterozygosity (46% for *E. nigrum* and 54% for *E. olmstedi*). The Pgi-1a allele in both the homozygous and heterozygous condition was species specific for *E. nigrum* whereas the presence of Pgi-1c and Pgi-2b in

the homozygous state was diagnostic of *E. olmstedii*. *Etheostoma nigrum* inhabited the Piedmont section of the James above the Fall Line, whereas *E. olmstedii* was below the Fall Line. The Appomattox River, a James River tributary traversing the Piedmont and Coastal Plain, contained *Etheostoma olmstedii* exclusively. The two species occurred sympatrically in Falling Creek, a small Piedmont tributary of the James River. Overall heterozygosity was higher for *E. nigrum* (10.3%) than *E. olmstedii* (5.1%) but both were within the range reported for teleosts. The study was supported in part by grants from the University of Richmond.

FAULKNER, LEE E., CHARLES J. BIGGERS, and HAROLD R. BANCROFT. Department of Biology, Memphis State University--Analysis of Esterase II Gene Frequencies of *Anthonomus grandis* of Western Tennessee.

Esterases of the cotton boll weevil from four sites in Fayette County, Tennessee were separated by vertical block polyacrylamide gel electrophoresis. The frequencies of the Est II alleles (Est^F and Est^S) were determined. Est^F ranged from .06 to .25 while Est^S ranged from .75 to .94. These frequencies were similar to those determined in 1976. Hardy Weinberg analysis of these frequencies indicated that the alleles were at equilibrium in all but one site ($P < .01$). Inbreeding was suggested as a probable cause of non-equilibrium. Influence of temperatures below freezing were studied for their effects.

FEEMAN, JOE C., and CHARLES F. SAYLOR. Tennessee Valley Authority--Findings from eight Tennessee valley streams.

Fish were collected by various seining techniques during the spring and summer months of 1979, 1980, and 1981 at selected sites on eight Tennessee valley streams as part of the Tennessee Valley Authority's Cumberlandian Mussel Conservation Program, a program involving various activities intended to conserve Cumberlandian mussel species which would be inundated by TVA's proposed Columbia Dam on the Duck River. New localities for state and federally protected fish species were obtained as well as range extensions for some other species.

FEIERTAG, JAMES A.¹, G. RONNIE BEST¹, and TIMOTHY P. KING.² ¹University of Florida and Florida Game and Fresh Water Fish Commission--Survival and growth of woody plant seedlings planted on reclaimed phosphate strip-mined lands.

In one of the first attempts to reclaim whole native wetland and upland ecosystems in Florida following strip mining for phosphate a reclamation research project was initiated in

1978. In this wetland and upland reclamation project over 10,000 bare-root seedlings representing over 16 tree species native to Florida forest communities were planted in multi-species test plots throughout the 19.8-ha reclaimed mine site during the winter of 1979. Seedling responses have been recorded annually over the past 4 years. Findings have been analyzed for overall species trends in survival and growth. In addition, tests have been performed to relate tree species response to factors including elevation and hydroperiod. Survival during the first year ranged from lows of 2% for *Pinus palustris* and 8% for *Populus deltoides* to 82% for *Taxodium distichum* with an overall survival of 51% for all species. Although seedling survival continued to decrease during the second (1981) and third (1982) growing seasons with net survival of 39% and 36%, respectively, the rate of decrease in survival slowed dramatically. In fact, by the third growing season net survival during that growing season was 93% for all species with most species exhibiting 85-100% survival. Although *T. distichum* had the highest survival rate, it also had the smallest net change in height (93%). Several distinct trends in both survival and growth were evident for the tree seedlings.

Flint, Kimberly B.^a and J.P. O'Neill^b
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X irradiation and cell cycle specificity

X-irradiation has been shown to induce mutations at the hprt locus of mammalian cells. The mechanism of induction was studied using Chinese hamster ovary (CHO) cells. CHO cells can be arrested in the G₀/G₁ stage of the cell cycle by incubating in serum-free medium and re-enter the cell cycle upon addition of medium containing serum. Arrested cells, when irradiated, show greater sensitivity to mutation induction than cells growing exponentially when irradiated. By adding medium containing serum to arrested cells at predetermined times prior to irradiation to coincide with the onset of S, M, and G₂, CHO cells show a definite cell cycle specificity to X-ray induced mutations. Sensitivity peaks during G₀/G₁ and decreases as the cells progress through the cycle, being least sensitive during S.

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FREDERICK, L., W. LENA AUSTIN, and ANTONIA WILFORD. Howard University--A natural mutant of *Neurospora dodgei* that forms asci with 8 to 16 round or peanut-shaped ascospores.

A mutant of *Neurospora dodgei*, a homothallic species, has appeared in corn meal agar (CMA) petri plate cultures derived from routine transfers from a stock culture. The mutant

forms enlarged asci that contain ascospores that are atypical in shape and number for *N. dodgei*. Stable axenic cultures of this mutant have been established. The mutant differs significantly from typical *N. dodgei* in several respects. When cultured on CMA, Westergaard's, and Czapek's agar media, mycelial growth is markedly slower, margins of the mycelial colony are highly irregular to "snow-flake" in appearance, and tufts of aerial hyphae are widely dispersed over the usually closely appressed mycelial surface. Perithecia of the mutant are commonly more globular than flask-shaped and frequently have poorly defined necks. Asci of the mutant are usually broadly expanded, contain from 8 to 16 ascospores, have poorly differentiated ascus tips, and appear to be incapable of forcible spore discharge. Ascospores vary in form from round to broadly oval to "peanut-shaped". Peanut-shaped ascospores appear to be the result of incomplete ascospore delimitation following an apparent additional mitotic division of nuclei during an advanced stage of ascosporeogenesis. Asci that contain 8 ascospores usually have peanut-shaped ascospores only. Asci with more than 8 ascospores may have 16 that are round or some lower number that represent a mixture of round, peanut-shaped or oval forms. The walls of all ascospores, regardless of shape, have a distinct rib-vein pattern.

FURY, JON R., AND R. DON ESTES. TENNESSEE TECHNOLOGICAL UNIVERSITY--An investigation into the declining aquatic macrophyte and fish populations of Woods Reservoir, Tennessee.

Woods Reservoir, a 4000 acre cooling impoundment in southcentral Tennessee, was once recognized for its abundant aquatic macrophytes and excellent warm and cool water fishery. Since 1977, the lake has exhibited a precipitous decline in aquatic plant growth to the point where few submerged aquatic plants are present, and only the emergent water willow is numerous. Concurrent with the decline in plant growth was a decline in the black bass, white crappie (*Pomoxis annularis*) and bluegill (*Lepomis macrochirus*) fishery. Largemouth bass (*Micropterus salmoides*) reproduction was reported to be very limited and growth rates for the black bass and white crappie have been found to be significantly slower in Woods Reservoir than in other Tennessee reservoirs. Largemouth bass do not average 10 inches in length until after their third summer of growth. In comparison, 10 inches in length at the end of one growing season is average throughout the rest of Tennessee. Poor growth rates have been attributed primarily to the paucity of adequate food sources. Threadfin shad (*Dorosoma petenense*) was the principle forage fish until it became eliminated by a winter kill in 1977. A poor spawn of gizzard shad (*Dorosoma cepedianum*) in 1982 was discovered during fall rotenone samples. All shad collected were over 100mm in length. Predator fish were found to outnumber the prey species they are dependent on. Woods Reservoir receives numerous point and non-point pollutants which may be attributed to the decline in the lentic ecosystem. At this point no single causative agent has been found.

GARTNER, T. KENT¹, MICHAEL E. DOCKTER², and LAURA S. GROSMAIRE¹. Memphis State University¹ and St. Jude Children's Research Hospital²--Glucose and galactose specific antibodies from human plasma.

In the course of isolating plasma fibronectin, it was discovered that a protein(s) other than fibronectin is eluted from particulate gelatin by a higher concentration of glucose than that which eluted fibronectin. Glucose derivatized Sepharose-4B was prepared as an affinity matrix to facilitate purification of this protein(s). This experimentation revealed that most normal human plasma contains antibodies which bind to both glucose and galactose. These sugar-binding immunoglobulins include IgA, IgG and IgM. The immunoglobulins which bind to the Sepharose-4B derivatized with glucose contains antibodies which are specific for glucose (in the sense that they do not bind galactose) and antibodies that bind glucose and galactose (independently). These antibodies do not bind to the galactose residues of the undervatized Sepharose-4B. Preliminary results indicate that at least 80% of normal blood donors have an easily demonstrable level of these antibodies. The level of the glucose-galactose specific antibodies ranges from 10µg to 60µg/ml in normal plasmas. Indirect immunofluorescence demonstrated that washed, normal erythrocytes bind exogenously added glucose-galactose specific antibodies. This technique did not reveal the presence of endogenous antibodies (present on the erythrocytes in the absence of exogenous antibodies) on these erythrocytes. The function of these antibodies is unknown and under investigation.

GLADDEN, J. B., D. M. WATERS, R. M. MUZIKA and J. D. HADDOCK. Savannah River Ecology Laboratory--Woody plant species recovery in disturbed Coastal Plain bottomland ecosystems.

Patterns and rates of vegetation recovery were examined in the Steel Creek stream and river-swamp bottomland system on the Savannah River Plant in South Carolina. Steel Creek received heated reactor effluents until 1968 and has since undergone vegetation succession. Two sites in upstream and river-swamp sections of the recovering creek system were selected for vegetation analysis; nearby, unaltered sites were analyzed for comparison. The unaltered upstream site was dominated by bald cypress (*Taxodium distichum*) and red maple (*Acer rubrum*), while cypress and water tupelo (*Nyssa aquatica*) were dominated in the unaltered swamp. Willow (*Salix* spp.) dominated the recovering sites with wax myrtle (*Myrica cerifera*) as a codominant upstream and buttonbush (*Cephalanthus occidentalis*) as subdominant downstream. The two upstream sites had considerably higher woody species diversity than the river-swamp sites. Topographic variations and differences in the magnitude and duration of flooding may account for between site differences. Although the recovering areas have reestablished a complete vegetation cover, basal area values in recovering sites are only 25% of those in unaltered sites and cypress reestablishment is minimal.

GORDON, BONNIE K. Memphis State University--Anatomical and physiological maturation of extra-testicular newt sperm
The newt (*Notophthalmus viridescens*) has some unique anatomical characteristics which make it especially valuable in the laboratory study of fertilization mechanisms. At least five distinct regions of the extra-testicular sperm duct, designated A through E from anterior to posterior, can be recognized by gross morphological characteristics. In addition, each of these regions is histologically differentiated and appears to produce secretions which control different maturational events. An in vitro bioassay was used to determine the fertilizing ability of sperm from the different regions. Nuclear condensation and fertilizing ability increase as the sperm move down the duct, reaching maximum in the G region. The secretion produced by the D region accumulates in the distal duct and acts as a plug in the E region to prevent the loss of sperm. This D/E material also appears to act as a natural inhibitor of sperm motility, fertilizing ability, and oxygen consumption.

GRIMM, DANIEL T.,¹ C. GEORGE HOLLIS,² and SUSAN L. TURNER.¹ Memphis State University¹ and Buckman Laboratories²--Thermophilic sulfate-reducing bacteria isolated from a Kraft paper machine system.
Several morphological variants of sulfate-reducing bacteria were isolated from an unbleached Kraft board machine operating at 55-57°C. Since little is known of the thermophilic microflora of such systems, the isolation of corrosion causing microorganisms in quantities in excess of 2400/gram of stock slurry is of economic importance to the paper industry. Preliminary studies indicate the thermophilic sulfate-reducing microflora include members of the genera *Desulfotomaculum* and *Desulfovibrio*.

GRISSINGER, EARL H. United States Department of Agriculture Sedimentation Laboratory--Evolution of lakes in the Mississippi River delta.
The Mississippi Alluvial Plain, colloquially termed the delta, is the broad, relatively flat flood plain of the Mississippi River. This landform is geologically relatively young; and the occurrence of lakes in this area is intimately related to the evolution of the delta itself. This landform reflects a major cycle of aggradation initiated by (a) base-level (sea-level) recovery during waning of the last glacial excursion, (b) reduced meltwater flow down the River, and (c) relatively high glacially-derived sediment loads. The formative controls of this landform were, thus, extrinsic to the delta area. Aggradation continued in the post-glacial (Holocene) epoch in response to frequent flooding resulting from storm runoff originating from extrinsic sources. The various types of lakes in the delta

area, including oxbow (meander cutoffs), bayous (relic channels from stream avulsions), and back-swamp or rim-swamp lakes, are typical of such aggrading fluvial systems. During the Holocene, intrinsic (local) controls became relatively more important, particularly at times of low stage of the Mississippi River; but extrinsic controls were periodically imposed during flood stage. The historic isolation of many of the lakes from the Mississippi River by crevasse plugging and levee construction has altered this natural condition, resulting in lakes controlled by local (intrinsic) climatic and land-use conditions.

GYLLENHAAL, CHARLOTTE. University of Alabama--Nutrient dynamics during slash-and-burn cultivation under young secondary forest in Panama.
Following cutting and burning of ten-year-old secondary growth an experimental plot was planted in maize. Crop yields and nutrient dynamics were monitored during four crops over two years. In the second year crop yields fell in weedy subplots and rose in less weedy subplots. Soil fertility, however, appeared to have been more limiting to yields than weed growth. Phosphorus and nitrogen were most limiting. Initially, levels of phosphorus and nitrogen were substantially higher in the partly-burned forest tree trunks and tree roots than in the soil. Nutrients released in the decay of these materials were critical in supporting crop and weed growth. In contrast, potassium, calcium and magnesium were present in the soil at levels far exceeding the demands of plant growth. Results will be with similar studies done in primary forest areas.

Hackney, Courtney T. and Carol S. Moorsee. University of North Carolina at Wilmington --Variations of shell morphology in the Carolina Marsh Clam, *Polymesoda caroliniana* (Bosc) related to environmental factors.
Six meristic characteristics of clam shells from six populations were determined and combinations of these variables used to determine if statistically significant differences between populations could be determined. Shell weight and shell surface area were particularly valuable discriminators. Even with small sample size (N=10) these two variables when regressed upon one another led to differentiation among populations. Even populations from different salinity zones within an estuary could be differentiated. Populations from low salinity, soft substrate sites had thinner, narrower shells.

HAMILTON, MEREDITH J. and GARY A. HEIDT. Memphis State University, and University of Arkansas at Little Rock--Microgeographic variation in the Mexican vole (*Microtus mexicanus*).

Microgeographic variation was assessed in 115 (62 male; 53 female) Mexican voles (*Microtus mexicanus*) from six localities in Jalisco, Mexico. Univariate and multivariate statistical techniques were employed in the data analyses. A total of 49 skeletal measurements were investigated, and, of these, 17 showed significant interlocality variation. Rostral breadth, depth of braincase, rostral height, width of third molar, and nasal length were found to be the most variable characters. Localities were projected onto three principal components based on correlation of characters. Component I (a size factor) accounted for 36% of the total phenetic variation; components II and III accounted for 30% and 19%, respectively. Larger individuals were found to occur at lower altitudes; smaller individuals occurred at higher altitudes. Size variation was determined as in reverse to Bergmann's Ecogeographic Rule.

HARDIN, JAMES W. North Carolina State University--Quercus of the Southeastern United States.

The treatment of the Fagaceae for the 2nd Vol. of the Vascular Flora of the Southeastern United States includes 38 species of oaks. Due to a variety of ways of treating problematical "species complexes" there are several differences in taxonomy between this treatment and those of several recent authors. In six of the complexes, the extremes of patterns of intergradation are treated as species rather than as varieties. These are *Q. austrina*, *geminata*, *margaretta*, *pagoda*, *prinoides*, and *similis*. On the other hand, two species, *Q. hemisphaerica* and *Q. inopina*, are not recognized as distinct but rather included within the polymorphic *Q. laurifolia* and *myrtifolia*, respectively. Two nomenclatural decisions, differing from some recent authors, reject the use of both *Q. prinus* and *sinuata* as nomina dubia. Several groups are in need of extensive study utilizing modern comparative techniques in order to derive a realistic and acceptable taxonomic treatment. Three of the most perplexing problems involve (a) *austrina* & *durandii*, (b) the "stellata complex" including *Q. stellata*, *margaretta*, and *similis*, and (c) the "laurifolia complex" with *Q. laurifolia*, *hemisphaerica*, *nigra*, and *phellos*. Until some definitive research is completed, we will be faced with a variety of taxonomic treatments that are formed out of the personal biases and inadequacies of the taxonomists providing the tentative treatments.

HARPER, JILL H. and ROBERT STEWART. Delta State University--A study of self-compatibility, pollination, and seed in *Sarracenia alata* (Wood).

In a study of self-compatibility in natural stands of *Sarracenia alata* (Wood) Wood, self-pollinations and cross-pollinations were performed by hand. To prevent natural pollination, unopened flower buds were placed in bags. After the flowers had opened, they were either self-pollinated or cross-pollinated by hand, and rebagged for the duration of the flowering period. To test for apomixis, some immature flowers were emasculated and bagged. Others were bagged in a test for natural self-pollination. Bags were removed after the flowering period. In August, ovaries were collected and counting of seeds and aborted ovules begun. In one ovary from a self-pollinated flower, 876 seeds and 67 aborted ovules were found. These and similar results indicate a high degree of self-compatibility in *S. alata*. The lack of seed from emasculated flowers suggests that apomixis is not occurring. Flowers cross-pollinated by hand and naturally-pollinated flowers produced large numbers of seeds. A few plants bagged to test for natural self-pollination produced one seed each.

HARTSOCK, LEE O. and STANLEY W. ASH. Marshall University--An anatomical comparison of the xeromorphy of selected species representing differing hydrophytic types.

An investigation was conducted to compare the anatomical organization and to quantify the xeromorphy of species representing differing hydrophytic types. Four species were selected to represent each of the submerged, emergent and bog hydrophytic types. The xeromorphy of each species was expressed as a xeromorphic index (X1) value derived from a composite of quantified anatomical values, which consisted of leaf thickness, cuticle thickness, palisade to mesophyll ratio, mesophyll density, stomatal number and number of dermal layers. Anatomical comparisons between the hydrophytic types were made for each variable. Mean X1 values for the hydrophytic groups were 1.085 for submerged species, 1.509 for emergent species, and 2.185 for bog species. All X1 component variable values were lowest for submerged species and highest for bog species. X1 values for individual species ranged from .339 for a submerged species (*Elodea canadensis*) to 2.623 for a bog species (*Andromeda glaucophylla*). Overall correlation demonstrated that the variables of stomatal number and palisade mesophyll ratio were the best estimators of the xeromorphic index value. The variables of palisade/mesophyll ratio and cuticle thickness were found to contribute most significantly to the overall X1 value.

HATCHER, ROBERT M. Tennessee Wildlife Resources Agency--Eagle restoration in Tennessee.

In a process known as hacking, young bald eagles were fed on artificial nests, with

minimum human contact until they learned to fly and become independent. The purpose was for these eagles to return, after reaching sexual maturity, to the general area for nesting. A total of 17 bald eagles have been hacked in Tennessee since 1980, with 10 at TVA's Land-Between-the-Lakes (LBL) and 7 at Reelfoot Lake. Twelve of these eagles were captive-born and 5 were from wild nests of Wisconsin and Minnesota. Daily care at LBL and Reelfoot Lake was provided for six-week periods by volunteers of the Tennessee Conservation League and Tennessee Ornithological Society (Memphis Chapter), respectively. Eagle hacking returnees are anticipated to return for nesting by approximately 1986, but there is a slight chance of this occurring as early as 1984.

HEINS, DAVID C. Tulane University -- Life history traits of the Florida sand darter, *Ammocrypta bifascia* Williams, and comparisons with the naked sand darter, *Ammocrypta beani* Jordan.

The life history of the Florida sand darter in the Blackwater River drainage in Okaloosa and Santa Rosa counties of northwest Florida was studied from 1974-1977. Reproduction occurred from April-July or early August. Females were all sexually mature at 38 mm SL and males were all sexually mature at 43 mm SL. Adult males were significantly larger than adult females. There was a significant difference from a 1:1 sex ratio, females outnumbering males; but this difference may have been due to gear selectivity. Clutch size ranged from 19-85 ova in females 39.5 - 52.5 mm SL and was significantly correlated with SL. Unovulated mature ova averaged 1.08 mm diameter (range = 0.80 - 1.33 mm). The maximum life span for most *A. bifascia* was 2+ years, but some individuals lived about 3 years. The life history traits of *A. bifascia* and *A. beani* will be compared and an attempt made to explain the two patterns that have been observed.

HERR, J. M. JR. University of South Carolina--Permanent Preparations of Root and Stem Sections Treated with Hydrochloric Acid-Phloroglucin.

Cross sections from roots of *Setcreasea pallida* and aerial stems of *Psilotum nudum* cut with a Hooker Plant Microtome (Lab-Line Instruments, Inc. No. 1225) 240 μ to 360 μ thick were fixed in formalin-propionic acid-50% ethanol (5:5:90), stored in 70% ethanol, and then treated with 1% phloroglucin in 95% ethanol and concentrated hydrochloric acid. After the lignified tissues exhibited the typical red color reaction, the sections were washed with several changes of absolute ethanol over a five minute period and then transferred to 4½ clearing fluid (lactic acid, chloral hydrate, phenol, clove oil, and xylene, 2:2:2:2:1, by weight) for ten minutes. The sections either were transferred to slides and mounted directly in Spurr epoxy medium or were first passed

through a graded series of clearing fluid and epoxy mountant (3:1, 2:2, 1:3, and pure epoxy mountant) with 15 minutes exposure to each mixture. After the preparation was covered, the epoxy mountant was cured at room temperature for a week. The color reaction which sharply distinguishes tracheary elements from sclerenchyma also reveals lignin in the casparian strips of the endodermal layers in both types of sections. Preparations have retained the characteristic color for over three years.

HORN, CHARLES N. University of Alabama--Anatomical adaptations to the aquatic environment in the Pontederiaceae, its taxonomic usefulness.

The new world genera of the Pontederiaceae; *Eichhornia*, *Heteranthera*, *Hydrothrix*, *Pontederia*, and *Zosterella* all show adaptation to the aquatic environment. Seedlings of all species are dimorphic, initially producing linear, non-petiolate juvenile leaves. There appears to be four developmental patterns beyond this stage: 1) retention of juvenile leaves, 2) development of floating, petiolate leaves at the time of flowering, 3) development of floating leaves with flexible petioles which are eventually replaced by floating or emergent leaves with rigid petioles, and 4) development of emergent, rigid-petioled leaves only. Anatomically, petioles have extensive lacunae, either randomly scattered or centralized. The lacunae are extremely well developed in the swollen petioles of *Eichhornia crassipes*. Leaves without expanded leaf blades lack the typical mesophyll layers, having, instead, extensive lacunae, even when they develop above the water. Stems have a central stele and scattered intralacunal vascular bundles in the cortex. An exception to this is *Hydrothrix gardneri*, which has a central lacunae. The anatomical observations do not follow current generic classification, nor should they, since the patterns appear to be the result of adaptations to the habitat in which each species grows.

HORN, CHARLES N. University of Alabama--*Zosterella* vs. *Heteranthera*, a little used genus in the Pontederiaceae.

The genus *Zosterella* Small appears to be distinct from *Heteranthera* R. & P. based on floral morphology, seed microstructure and cytology. External morphology and vegetative anatomy are rather poor indicators of taxonomic affinity since the morphologies are probably a result of living in a submerged habitat, a trait common to the Pontederiaceae. Major floral characters supporting two genera are the three equal sized stamens with swollen filaments of *Zosterella*, which can be distinguished from the dimorphic stamens with noninflated filaments of *Heteranthera*. Seeds of *Heteranthera* are small and have well developed wings, in comparison to *Zosterella* seeds, which are larger and have poorly developed wings. The base chromosome number common to the family is n=8, with *Heteranthera* also having n=7. In contrast, *Zosterella* has a base number of n=15.

HOWARD, JAMES H., RICHARD L. RAESLY, and EDWARD L. THOMPSON. Frostburg State College, Horn Point Environmental Laboratory, and Maryland Natural Heritage Program--Genetic isolation in cave populations of the Spring salamander, *Gyrinophilus porphyriticus*, from West Virginia.

Genetic variation within and among selected populations of the Spring salamander, *Gyrinophilus porphyriticus*, has been examined using starch gel electrophoresis. Thirty enzyme systems have been specifically stained resulting in the resolution of 34 loci in samples from six populations of *Gyrinophilus*. Three of these samples are from cave environments and are morphologically distinct from populations sampled outside the caves. Although the $\bar{x}$ heterozygosity is very low ($< .05$) for vertebrates, variant alleles in these samples are present at a number of loci and demonstrate gene flow between exterior and cave populations. A hypothesis of differential gene expression in development is presented to account for the striking morphological variation and the taxonomic status of *Gyrinophilus subterraneus* is questioned.

HUENNEKE, LAURA F. and REBECCA R. SHARITZ. Savannah River Ecology Laboratory--The role of microtopography in woody plant regeneration in a cypress-tupelo swamp.

Limited availability of "safe sites," or suitable microsites for seedling growth, is sometimes suggested as a cause for infrequent recruitment in cypress-tupelo swamp forests. We are investigating the roles of various microsites in woody plant regeneration in swamp forests at the Savannah River Plant, South Carolina. At least 16 distinct types of microsites and microtopographic features can be recognized; they differ in substrate texture, availability of water and nutrients, stability during flooding, and protection from erosion or sedimentation. We describe the relative availability of various microsite types in a typical deep-water swamp and in an area perturbed by the higher water volumes and sediment loads of a stream carrying thermal effluents. We have measured the distribution of woody seedlings (trees, shrubs, vines) among microsite types, and we demonstrate differences in distribution patterns between species. Any influences on a wetland that alter the availability of microsites (by changing sedimentation, the density of downed wood, etc.) may thus affect regeneration processes in the plant community.

HUEY, DAVID W.¹, DONALD E. WATENPAUGH², and THOMAS L. BEITINGER². Louisiana State University at Alexandria¹ and North Texas State University--Nitrite exposure influences the critical thermal maximums of channel catfish.

Channel catfish, *Ictalurus punctatus* were exposed to varied concentrations of nitrite for

24-h and their critical thermal maximums determined. Control fish had critical thermal maximums of $38.02 \pm 0.39^{\circ}\text{C}$ and methemoglobin concentrations of $9.0\% \pm 14.5$. Fish exposed to $1.41 \text{ mg/L NO}_2\text{-N}$ had critical thermal maximums of $35.91 \pm 0.93^{\circ}\text{C}$ and methemoglobin concentrations of $84.8\% \pm 17.0$. Nitrite concentrations and critical thermal maximums were significantly related ($r^2=0.51$ $p<0.01$).

HUGGINS, JAMES A. and MICHAEL L. KENNEDY. Memphis State University--Geographic variation in the masked shrew, *Sorex cinereus*.

Morphologic variation in the masked shrew, *Sorex cinereus*, was assessed with univariate and multivariate analyses. The species demonstrated variation across age classes in varying patterns. It was also found to be sexually dimorphic with female skulls generally more massive. A matrix of correlation among characters was computed, and the first three principal components were extracted. These accounted for 83.7% of the total phenetic variance for males and 84.0% for females. Three-dimensional projections of localities onto principal components showed that, for both males and females, patterns of size variation varied among geographic areas sampled with no large scale directional trends apparent. Size in both sexes was correlated with changes in annual and July actual evapotranspiration as well as with the number of sympatric soricid species present.

HUNER, JAY V.

Southern University and University of Kuopio (Finland)--Asphyxiation in warmwater and coolwater crayfishes.

Warmwater, burrowing crayfishes are thought to be more tolerant of dissolved oxygen stress than coolwater, nonburrowing species. Two warmwater, burrowing crayfishes, *Procambarus acutus acutus* and *Procambarus clarkii* (Cambaridae) and one coolwater, nonburrowing crayfish, *Astacus astacus* (Astacidae), were submerged in airtight containers until they had clearly lost consciousness. The remaining dissolved oxygen (DO) was then measured. There were no significant differences in DO (means, 0.3-0.4 ppm) for adult and juvenile warmwater crayfishes. Adult coolwater crayfish were tested at a lower temperature (20 C. vs 25 C.) and a different time of year (fall vs spring), but remaining DO's were significantly higher at 0.8-0.9 ppm. No juvenile coolwater crayfish were tested. Neither sex or molt stage had any apparent effect on remaining DO in juvenile warmwater crayfishes. All adult crayfishes were intermolt (C). Adult male *P. clarkii* and *A. astacus* succumbed faster than females but small sample sizes do not permit definitive statements about sex differences. Considering available oxygen, juvenile warmwater crayfish succumbed at a rate about 10 times that of all adult crayfishes. The two warmwater crayfishes studied here proved to be more tolerant of DO stress than one species of coolwater crayfish. Partial support for this study by the Academy of Finland is gratefully acknowledged.

JOHNSON, GEORGE P. North Carolina State University--The foliar trichomes of North American Castanea.

As part of a taxonomic revision of the chinquapin chestnuts (Castanea section Balanocastanon) foliar trichomes of these taxa were examined by SEM for qualitative and quantitative differences. Castanea dentata (section Castanea) was also examined because of the putative hybrid, C. x neglecta Dode, it forms with the chinquapins. Five trichome types from the chinquapins have been identified: simple, bulbous, solitary, fasciculate, and stellate. The trichome compliments of the chinquapin taxa differ from each other only quantitatively, but differ both qualitatively and quantitatively from that of C. dentata. Only three trichome types have been identified from C. dentata: bulbous, solitary, and fasciculate. Artificially produced C. x neglecta was examined and found to be intermediate between the two sections in the type and frequency of its trichomes. Foliar trichomes are a useful taxonomic character in the identification of the North American Castanea taxa and their hybrids.

JOHNSON, SANDRA STRAWBRIDGE AND SHARON PATTON. University of Tennessee--Serological survey for Toxoplasma antibodies in raccoons of Cades Cove, Great Smoky Mountains National Park, Tennessee. Toxoplasma gondii is the causative agent of toxoplasmosis, a protozoan zoonosis found throughout the world. Cats of the family Felidae are the only known definitive host for T. gondii; however, a wide variety of animal species is susceptible to infection as intermediate hosts. In conjunction with an ecological study of raccoons in Cades Cove, Great Smoky Mountains National Park, blood was collected to be screened for antibodies to Toxoplasma. Serum was separated from the blood samples and stored at -70°C until analyzed by indirect hemagglutination. From October 1981 - October 1983, 91 sera were tested; 38% of the samples from female raccoons and 41% of the samples from male raccoons were positive.

JONES, RONALD L. Eastern Kentucky University--A comparison of Aster sections: Brachyphylli, Grandiflori, and Patentes.

There are about 10 species in sections Brachyphylli, Grandiflori, and Patentes of the genus Aster. All are perennials with pubescent stems and leaves, the leaves clasping or nearly so, and the herbaceous-tipped phyllaries variously pubescent, often glandular. These species are mostly inhabitants of the eastern United States, and they all have chromosome numbers based on $x=5$. The relationships among these taxa

have been the subject of recent studies, and some workers have placed them, along with other base-5 asters, in a segregate genus. There are also published differences in the disposal of the species among the sections. A morphological comparison shows that A. patens, A. phlogifolius, and A. georgianus form the most natural grouping--the Patentes. The union of A. adnatus and A. walteri into the section Brachyphylli, however, appears to be questionable. In the section Grandiflori the species affinities are also troublesome, with A. grandiflorus standing somewhat apart from A. novae-angliae, A. oblongifolius, and relatives. The resolving of these problems of sectional unity depends on additional morphological and cytological studies.

JONES, STEVEN M. and GARRY G. HAEHNLE. Clemson University--Geographical distribution of Quercus oglethorpensis Duncan.

The historical distribution of Quercus oglethorpensis includes nine counties within the Piedmont of Georgia and South Carolina and one parish in Louisiana. The species is considered as threatened throughout its range. Prior to this study, estimates of the number of stations that have been extirpated since the species was discovered in 1940 were as high as 50%. Therefore, this study was conducted to determine the historical and present distribution of Q. oglethorpensis. Prior to this study, 45 stations of Q. oglethorpensis had been reported throughout its range. Eighty-nine percent of these stations were found to still exist. During this study, 100 previously unreported stations were located; thus bringing the total number of existing stations to 140, which represents a 350% increase. Interpretation of past land-use patterns indicate the species was probably most heavily decimated by agricultural land clearing prior to its discovery by Duncan in 1940.

JOY, JAMES E. Marshall University--Chaetogaster limnaei (Annelida: Naididae) in Helisoma trivolvis from Charles Fork Lake, W. Va. Chaetogaster limnaei von Baer was recovered from 271 of 286 (94.8%) Helisoma trivolvis (Say) individuals collected monthly from February thru October 1983. Prevalence was less than 100% only in July (86.9%) and September (70.0%). Monthly mean numbers of C. limnaei per infected snail were low, peaking at 17.1 and 16.4 in May and June, respectively.

JOY, JAMES E. and ANITA J. PRITCHARD. Marshall University--Ergasilus centrarchidarum and Achtheres micropteri (Copepoda: Lernaepodidae) from largemouth and spotted basses in Beech Fork Lake, West Virginia. Ergasilus centrarchidarum was recovered from 21 of 42 spotted bass,

Micropterus punctulatus, and 31 of 75 largemouth bass, M. salmoides, collected in southwestern West Virginia from May through October 1981. A Chi-Square contingency test showed no significant difference (at the .05 level) in incidence of E. centrarchidarum between the two species of basses. The number of ergasilids was low, ranging from one to 13 individuals per host. Only three Achtheres micropteri individuals were found. One each from three spotted bass.

KASIM, AHMED A. and YASIR R. SHAWA

Zoology Department, College of Science, King Saud University, Riyadh, Saudi Arabia--Coccidia from sheep (Ovis aries) in the Saudi Arabia.

During the course of a survey of the species of coccidia occurring in domestic sheeps (Ovis aries) in Saudi Arabia, a total of 593 faecal samples from five different regions of the Kingdom were examined for coccidia infection. Ten different species of Eimeria were recognized; E. ovina, E. weybridgeensis, E. parva, E. faurei, E. crandallii, E. ninakohlyakimovae, E. ahsata, E. granulosa, E. intricata, and E. pallida. 86 % of animals examined were positive. Mixed infections were common, 51.5 % of the animals carrying 3-5 different species. E. ovina and E. weybridgeensis occurred most frequently and generally the most predominant species. The prevalence of infection was higher in Eastern region (93.3 %) than in Western (90.6 %), Southern (89.8 %), Central (79.4 %) and Northern region (77.5 %).

KNIGHT, LUTHER A., JR., AND JACK HERRING. University of Mississippi, and Mississippi Department of Wildlife Conservation--Changes in the Fisheries of the Mississippi River Alluvial Plain.

Land use changes from forestry to extensive agriculture during the past 70 years has greatly affected fisheries of the Mississippi River alluvial plain both as a result of increased sediment load and agriculture chemicals. An abundance of potentially productive fishing waters exists in the plain, but during the past two decades game fish populations have declined and have been replaced by increased numbers of rough species. There has been a shift to nongame species in both numbers and biomass with gizzard shad (Dorosoma cepedianum) showing increasing dominance, and with a number of lakes and streams no longer supporting harvestable populations of largemouth bass (Micropterus salmoides). Since the banning of residual pesticides including DDT in the early 1970's panfish such as crappie (Pomoxis spp.) have shown recovery in previously contaminated lakes, and more recently, fingerling largemouth bass have been observed in several of these lakes. The future of these fisheries will depend on judicious land use management practices.

KNIGHT, SCOTT and H. R. ROBINETTE. Auburn University, and Mississippi State University--Food habits of five Tombigbee River fishes.

The stomach contents of five species of fishes from three cutoff bendways and one natural bendway in the Tennessee-Tombigbee Waterway (Tombigbee River) were collected from December 1979 to September 1980 as a part of a field investigation. The five species subjected to analysis, Micropterus salmoides, Pomoxis annularis, Pomoxis nigromaculatus, Lepomis macrochirus, and Fylodictus olivaris were collected by hoop nets and electroshocking gear. The food items were identified to the lowest possible taxa, counted and measured by weight and volume. Food habit analysis indicated that Micropterus salmoides, Pomoxis annularis, and Pomoxis nigromaculatus, fed primarily on small fishes. However, benthic invertebrates were important components of the diets of both species of Pomoxis. Lepomis macrochirus consumed large numbers of fish eggs, but benthic and terrestrial invertebrates were the most important foods by weight. Centrarchid fishes were found to be the major components of the diets of Fylodictus olivaris.

KOCH, WILLIAM J. University of North Carolina at Chapel Hill--Workshop: How to incorporate small group work into large lecture courses.

This workshop answers the following questions: (1) Why should I use small groups in my lecture course? (2) How do I break a large class into small groups? (3) What basic group skills do my students need to learn? (4) What content can I teach well using small groups? (5) How do I get started with using groups in my course next fall if I choose to do so? (6) How do I assess the work? These six questions will be answered using the following module: a) lecturette, b) small group work, c) whole-group summation. Small group work enhances the higher-order learning of biological topics. Students can be grouped either by arbitrary or by self-assertion methods, and either way leads to heightened interest and excitement about the biological content. And as a bonus, students automatically gain interpersonal and group skills that are useful in other college work.

KOVACIC, DAVID A. and KENNETH W. McLEOD. Savannah River Ecology Laboratory--A comparison of forest nutrient dynamics in South Carolina and New Mexico following prescribed burning.

The role of prescribed burning and its affect on nutrient cycling is important to the successful management of coniferous forest ecosystems in both the southeast and the southwest. A regional approach to fire research may lead to the development of ecological theory and management policy better able to contend with drastically different regional responses to fire. The effects of prescribed burning on soil and

forest floor were compared between a longleaf pine (*Pinus palustris*) forest in Aiken County, South Carolina and a ponderosa pine (*Pinus ponderosa*) forest in Sandoval County, New Mexico. In these relatively nutrient poor ecosystems, we examined levels of soil and forest floor Ca, K, Mg, N and P, at 0, 1, 7, 14, 30 and 180 days following burning. Ca, K, Mg and P were consistently higher in the longleaf pine forest floor; however, they were consistently lower in the longleaf pine soil. Nitrogen was the only element that differed in the above pattern being higher in both the ponderosa pine forest floor and soil. The consistent pattern found in Ca, K, Mg and P may indicate different strategies of nutrient conservation between longleaf forests with readily leachable soils and low CEC and ponderosa pine forests with lower rates of leaching and higher CEC.

KRAMER, J.D. and B.J. BOGITSCH. Vanderbilt University--A biochemical study of acid dipeptidyl aminopeptidase activity in schistosomes.

It is hypothesized that acid dipeptidyl aminopeptidase (DAP) activity is the final step in the degradation of host hemoglobin in the digestive tract of schistosomes. Lyophilized adult worms of *Schistosoma mansoni* and *Schistosoma japonicum* were homogenized in 0.2 M citrate buffer at pH 5.0 and centrifuged. The supernatant was collected and designated as crude enzyme preparation (CEP). The CEP was subsequently tested for dipeptidyl aminopeptidases I and II. Assays for the peptidases were carried out using specific amino acid derivatives of 4-methoxy-2-naphthylamide. The resulting reaction products were coupled to the diazonium salt, Fast Blue B according to the method of Smith and van Frank (1975) and the resulting azo dye was read spectrophotometrically at 530 nm. It was observed that the pH optima of the enzymes are in the upper acid range. DAP I is a sulfhydryl-dependent enzyme and the removal of -SH grouped from the incubating medium significantly reduced activity. A series of inhibitors was tested among which were the trypanosomocidal compounds Trypan Blue and Suramin. Results from these tests will be presented with a discussion of their potential for drug therapy. This investigation received financial support from the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases.

KYLE, DENNIS E. and GAYLE P. NOBLET. Clemson University--Distribution of small free-living amoebae in benthic, planktonic and neustonic habitats.

Environmental sampling to determine the distribution and abundance of small free-living amoebae previously has included only sediment and/or surface water samples. The purpose of this study was to determine the relative importance of benthic, planktonic and neustonic habitats on the occurrence of potentially pathogenic free-living amoebae. Largest numbers of amoebae were isolated generally from benthic samples. Free-water samples contain-

ed few amoebae except when taken from particulate layers found in association with the thermocline. Although particulate layer composition varied, major components were bacteria, microflagellates, and organic debris. At deep water stations, more amoebae were found in the surface microlayer (300 μ m) than in water samples collected at a depth of 5 cm. Amoebae were more evenly distributed at shallow water stations, but numbers of amoebae exceeded those isolated from deep water stations. Species composition varied with habitat. *Acanthamoeba* spp. were found predominantly in benthic samples. *Naegleria* and *Hartmannella* spp. occurred both in benthic samples and particulate layers.

LAMOREAUX, WILLIAM J. and P. S. RUSHTON, Memphis State University--Circadian pattern of transferrin in *Mus musculus*.

Serum containing transferrin, a β -1-glycoprotein that transports iron from sites of absorption in the duodenum to areas of iron utilization, was tested for the total iron-binding capacity (TIBC) in *Mus musculus* at three hour intervals. The TIBC measurement allows for the determination of the amount of transferrin protein present in the plasma. Preliminary data indicate a peak at 2000 hours and a trough at 0500 hours, based upon the arithmetic mean for the given times. Analysis of TIBC was done using the micromethod of Caraway (1963). These results conflict with the report of Schade, et. al. (1980) as they reported a peak at 0200 hours and a trough at 1800 hours in the rat. The maxima and minima occur in the dark cycle in both the mouse and the rat.

LASALLE, MARK W. and ARMANDO A. DE LA CRUZ. Mississippi State University--Notes on the life history of the funnel web spider *Agelenopsis barrowsi* (Gertsch) in a Mississippi brackish water marsh.

Data on the life history of *Agelenopsis barrowsi* were collected in the course of a 15 month study of the spider community in a brackish water marsh dominated by *Spartina cynosuroides*. The study was conducted between January 1982 and April 1983 in a marsh in St. Louis Bay. This spider builds a typical funnel-shaped web at the surface of the litter layer of the marsh which may be as much as 25 cm deep. Old broken grass culms are often used as the retreat at the apex of the web. This species has a one year life cycle. Adult females lay their eggs in February and March in silken cases within the retreat. From one to four cases are laid with between 10 and 25 eggs in each. Females die soon after the second instar spiderlings hatch. Spiders reach maturity in about 6 months as mature adults begin to appear in September. At some time in the fall male spiders seek out a female and mating takes place. Males do not overwinter as evidenced by dead males found in the retreats of overwintering females.

LASALLE, MARK W. and JOHN T. MORROW.
Mississippi State University--Effects of salinity on the larval development of the estuarine snail Neritina usnea (Roding).

The effect of various salinity levels on larval development of the euryhaline snail *Neritina usnea* was tested. Developmental time, size of larvae and mortality were monitored at salinity levels of 0, 1, 5, 10, 15, 20 and 35 o/oo. Since female snails deposit several egg cases in rapid succession, a group of cases may be tested at several salinity levels simultaneously. Groups from several females were tested. Experimental females were maintained at 5 o/oo and individual cases were acclimated for 6 hours in each salinity level until they reached the desired level. All tests were run at 24° C. Mean developmental time ranged from 5.2 to 10.5 days. The development times at 20 and 35 o/oo were significantly different from the lower five levels and from each other ($P < 0.05$). Mortality of eggs and larvae occurred only at 35 o/oo. The size of larvae varied within groups of egg cases from single females. Larvae in 0 o/oo were larger than in other treatments while larvae in 35 o/oo were smaller. Trends at other salinity levels were not apparent.

LEBERG, PAUL L. and GEORGE D. BAUMGARDNER. Memphis State University--Morphologic variation in the coyote, Canis latrans, in the southern United States.

Morphologic variation in coyotes (*Canis latrans*) from the southern United States was assessed using univariate and multivariate statistical techniques. Twenty-one cranial measurements were analyzed from 496 adult specimens (267 males, 229 females). Sexual dimorphism was determined in 20 characters. Sixteen measurements showed significant interlocality variation for males and 16 for females. A matrix of correlation among skull characters was computed, and the first three principal components were extracted. These accounted for 87.15% and 94.67% of the variation in the character sets of males and females, respectively. In general, Texas (Dallas) and Louisiana specimens were found to be largest in size while those from western Texas and Oklahoma were smallest.

LEE, ROBERT M., III. Memphis State University--Food habits of the coyote, Canis latrans, in Tennessee.

Digestive tracts of 51 Tennessee coyotes, *Canis latrans*, were examined for food content during 1981 and 1982. Specimens examined were from 16

counties in western and middle Tennessee. Sample size per county ranged from 1 to 9. The most common items found and their percent occurrence were: grass (85.2), rodents (37.0), persimmon (31.5), rabbit (27.8), insects (11.1), and livestock (9.3). Relationships among food items and localities were considered. The coyote appeared to be an opportunistic feeder and consumed a wide variety of food types.

LEGRANDE, WILLIAM H. University of Wisconsin Stevens Point--Karyology of three rare madtoms, genus Noturus, from the south-eastern U.S.

Three madtom species, genus *Noturus*, were karyotyped to determine diploid number and morphology of the karyotype. Two species, *N. baileyi* and *N. sp.* ("broadtail" madtom) had not been karyotyped previously. The third, *N. flavipinnis* had been previously studied from specimens obtained from Copper Cr., Scott Co., Virginia, but additional specimens from Citico Creek in Tennessee were examined to determine if chromosomal divergence between the Tennessee and Virginia populations was evident. Two specimens of *N. baileyi* were found to possess diploid numbers of 42 and two specimens of the "broadtail" madtom were found to possess diploid numbers of 50. *Noturus flavipinnis* from Tennessee was found to possess the same diploid number ($2N = 52$) as specimens previously obtained from Copper Creek in Virginia. The diploid numbers for *N. baileyi* and the "broadtail" madtom differ from those of previously postulated relatives within *Noturus*.

LEWIS, PATRICIA H. Wesleyan College--Vegetational survey of the foraging habitat of baboon hybrids of Papio anubis and Papio hamadryas, Awash River, central Ethiopia.

Savannah and semi-desert thornscrub merge in the Awash valley of central Ethiopia and represent a foraging area for hybrids of *Papio anubis*, a savannah species, and *Papio hamadryas*, a desert species. Relative dominance and movement of anubis and hamadryas in the hybrid zone are thought to change in response to shifting habitat conditions occasioned by rainfall-drought oscillations. Vegetational surveys of the foraging ranges of two known hybrid troops were made. Species identifications and population analyses of thornscrub quadrats and gallery forest quadrats were made in August, 1983. Rainfall data for the area was obtained for the twelve month period prior and was compared to the rainfall data prior to the 1973 drought. Abundance of

grasses (Gramineae), Acacia, Grewia, Justicia, and other plant species in the diet of baboons in response to higher amounts of rainfall indicate that the vegetation of the hybrid zone is recovering from the severe drought of the mid 1970's. Data from the survey of 1983 will permit both retrospective and prospective comparisons of troop movements and will form a basis for quantifying the relationship between varying rainfall, vegetation and hybrid zone changes.

LINQUIST, DAVID G., M. VIRGINIA OGBURN, W. BOYD STANLEY, HERMAN L. TROUTMAN and SUSAN M. PEREIRA. University of North Carolina at Wilmington--Utilization of rubble-mound jetties by fishes.

Visual surveys and collections of fishes were conducted on recently constructed (1980) and older (1966) jetties at Masonboro Inlet, North Carolina, for analysis of their composition, relative abundance, seasonality, vertical distribution and feeding ecology. The primary residents were porgies (3 species), black seabass, tautog and pigfish. Bluefish, spot and blue runner were the primary transients. Black seabass were more abundant near the bottom of the jetties while porgies, bluefish and pigfish were more abundant at mid-depth surveys. Except for greater numbers of pigfish and sheepshead at the new jetty, the abundance and composition of the new and older jetties were similar. The abundance and composition of near-bottom fishes inhabiting the inlet and ocean sides were also similar except for a greater abundance of pigfish at the ocean side. Spottail pinfish were more abundant on the ocean side of mid-depth surveys while black seabass and spot were more abundant on the inlet side. The number of species was greater during warm months. Gut contents of tautog indicate a diet of scorched mussels and gray pygmy venus for adults and caprellid and gammarid amphipods for juveniles. Spottail pinfish ate microcrustacea and algae while pinfish ate microcrustacea, fish material (including scales), hydroids and algae. Results suggest that resident fishes utilize the jetties for food and shelter. Jetties appear to offer conditions especially favorable to young reef fishes.

LINDSAY, DAVID S.,¹ JOHN V. ERNST,² WILLIAM L. CURRENT,¹ BARRY P. STUART,³ and T. BONNOR STEWART,⁴ Auburn University,¹ U.S.D.A. Animal Parasitology Institute,² Mobay Chemical Corporation,³ and Louisiana State University.⁴ Prevalence of coccidian oocysts from sows housed on pastures in Alabama, Georgia, Louisiana, and Maryland.

Fecal samples were collected from 47 sows from Alabama, 55 sows from Georgia, 56 sows from Louisiana, and 91 sows from Maryland. Sows were housed on pastures and confined only just prior to farrowing and during lactation. Samples were mixed

in 2.5% (w/v) potassium dichromate solution and were sporulated for 10 to 14 days. Upon examination, 90.8% of the total samples contained oocysts. The most prevalent species found were Eimeria deblickei (61.4%), E. porci (55.0%), E. scabra (51.8%), and E. neodeblickei (50.2%); also, commonly found were E. suis (33.7%) and E. polita (24.1%). Oocysts of E. perminuta (6.8%), E. spinosa (2.0%) and Isospora suis (0.4%) were not commonly observed. Oocysts of E. spinosa were found only in samples from Maryland sows. Oocysts of I. suis, the causative agent of neonatal porcine coccidiosis, were found only in 1 of 56 samples from Louisiana. Oocysts of E. deblickei, E. neodeblickei, E. perminuta, E. polita, E. porci, E. scabra, and E. suis were found in samples obtained from sows in all 4 states. Supported in part by USDA grant No. SEA-592011120510 to WLC.

LINTHICUM, MARGARET L., WILLIAM J. VAIL, and ROBERT K. RILEY. Frostburg State College--Axenic culture of an endomycorrhizal fungus-Gigaspora margarita.

The inability to culture an endomycorrhizal fungus has been a problem in mycorrhizal research for many years. Preliminary data from this laboratory indicate that the culture of an endomycorrhizal fungus is possible. The azygospores of Gigaspora margarita were separated from soil using wet sieving and decanting techniques. The azygospores were further freed from debris by the employment of a glycerol gradient and centrifugation. Collected spores were surface sterilized and germinated on a natural medium. Cultures of Gigaspora margarita have been maintained axenically in the laboratory and have produced azygospores in culture. Sorghum-Sudan grass and Gigaspora margarita inoculum were combined on various substrates and allowed to grow. Roots were collected periodically and examined for the presence of endomycorrhizal infection. Evidence indicates that the endomycorrhizal association is formed under laboratory conditions.

LUSHBAUGH, WB,¹ MF HENNINGTON,¹ SA PENNICK,² AC TURNER,¹ and WF HUTCHISON.¹ University of Mississippi Medical Center¹ and State Dept. of Health²--Endemic Giardiasis in Day Care Centers
Giardia lamblia is a flagellated protozoan parasite that inhabits the small intestine of man. Although often asymptomatic, G. lamblia infection can cause loose, foul smelling stools and abdominal discomfort. Chronic diarrhea accompanied by maldigestion and by malabsorption of fats and vitamins can lead to "failure to thrive." Diarrhea is a common problem in the 1144 licensed day care centers of this state with over 66,000 attendees. After several day care centers in the metropolitan Jackson area reported problems with diarrhea, stools of children in attendance were checked. The presence of G. lamblia cysts was detected by a single zinc sulfate

concentration test. Children aged 8 to 21 months were 52% (34/66) infected while children aged 25 to 32 months were 37% (21/57) infected, a statistically significant difference. The overall infection rate in the 123 children studied was 45%. In stools examined by the State Dept. of Health in 1982 the *Giardia* positivity rate was 7.3%. The diagnosis of giardiasis based on microscopic exam of the stool is believed to underestimate actual infection rates. Serological tests for detection of *Giardia* antigen in stool are being developed and applied to the panel of stools collected in this study. The demonstration of *Giardia* cysts and/or antigen in stools is important in detecting asymptomatic giardiasis. Infected asymptomatic children are the major reservoir of cysts passed hand to mouth causing persistent exposure of day care children to infection. Control of chronic disease requires close monitoring of the population at risk.

MAINWARING, H. R. and JAMES HORTON.
Western Carolina University--Producing video tapes for general class use.

Each of the authors used a different initial approach to the problem of producing one of a series of video tapes designed to serve as a preview/review aid for a general botany laboratory. One of us (H.R.M.) initially concentrated on the visuals with a mental outline of the text, and subsequently arranged the text to fit the visuals. The other (J.H.H.) initially concentrated on the text with a mental inventory of the available visuals, and subsequently arranged the visuals to fit the text. Both agree in retrospect that a compromise between these two approaches will probably lead to more efficient completion of the task. Excerpts from the tapes illustrating the final results of the two approaches will be shown and discussed.

MANHART, JAMES R. University of Georgia
--Cytology of *Carex purpurifera* Mack.

Field work and morphological studies on section *Laxiflorae* of the genus *Carex* L. revealed morphological variation in *C. purpurifera* Mack. This variation is correlated with geographical distribution. *C. purpurifera* appeared to consist of two taxa, one found on soils derived from limestone in the western part of the range and the other on non-limestone derived soils in the eastern part of the range. The morphological differences were retained in greenhouse grown plants. Pollen mother cell (PMC) counts were made. The western populations had counts of $n = 17, 18,$ and 19 . The eastern populations had $n=14$ only, the lowest obtained in section *Laxiflorae*. The cytological data support the hypothesis that *C. purpurifera* consists of two distinct taxa.

MARBURY, KENNY, J. C. WILLIAMS, and SARA W. SCHEIDE. Louisiana State University--Hypobiotic changes in *Ostertagia ostertagi* during environmental adaptation.

Ostertagia ostertagi undergoes inhibition at the early fourth larval stage in the abomasum of cattle during the spring (March, April and May) in the warm tropical climatic conditions found in the southern United States. In the cooler climatic conditions characteristic of the northern United States such inhibition occurs in the fall (September, October and November). In order to determine the relative significance of environmental or genetic factors on induction of larval inhibition of *O. ostertagi* in cattle, separate one-acre pasture plots in a warm tropical climatic region were contaminated in the fall and spring by animals carrying an Ohio isolate or a Louisiana isolate of gastrointestinal nematodes. Three successive groups of parasite-free calves were grazed on plots 14 days at three-week intervals. The tracer calves were killed for worm counts 10 to 12 days after removal from pasture. Both groups showed little or no inhibition in the fall. During the spring experiment, 72% of the *O. ostertagi* population acquired by calves grazed on the Louisiana plot were inhibited during development; only 6% of the *O. ostertagi* population was inhibited by calves grazed on the Ohio plot.

MARTIN, BEN F. and SHIRLEY C. TUCKER.
Louisiana State University at Alexandria and Louisiana State University--Shoot tip abortion in *Smilax*.

Shoot tip abortion has been studied in several dicotyledonous species but has not been described for a monocotyledon. This study reveals that shoot tip abortion occurs in at least one species of *Smilax*. Observations on *Smilax pumila* indicate that shoot growth in this species is determinate. New shoots reach a point at which growth in height ceases and they then assume a trailing habit. A number of changes become evident in apices of the erect shoots prior to their assuming the trailing habit. The shoot apical meristem becomes low-convex to flat and differentiation is evident in the surface layers. Pith differentiation encroaches to within 50um of the summit. In later stages, an abscission layer forms in the internodal region and there is cellular degeneration of the tip above this level. The bud withers and is ultimately cast off.

MASON, PHILLIP J. Berry College--Aspects of the reproductive physiology of the male American woodcock (*Colinus virginianus*) in Alabama.

Reproduction by woodcock overwinters in the Southeast is more consistent and intense than earlier believed. However, information about the chronology of spermatogenesis and serum

testosterone levels in the male on the "wintering" grounds is lacking. This study was designed to determine the relations among testis morphology, spermatogenic stages, spermatozoan numbers and testosterone levels to better understand the southern breeding cycle. During the winters of 1979-80 and 1980-81, 100 males were collected. Testes were processed by standard procedures and serum testosterone levels were determined in 48 birds using a double antibody radioimmunoassay. Of 91 males collected after 1 January in both years, 72 were in Stage 5 (spermatozoa in majority of seminiferous tubules), reaching full spermatogenesis under a maximum photoperiod of 10.7 hours. All males (n=52) collected after 1 February were in Stage 5. Spermatogenesis and testosterone levels were significantly correlated to testis length, weight and spermatozoan numbers in both years. Only 15.3% of males with testes ≥ 5.0 mm in length were not in Stage 5; and of the 72 birds in Stage 5 only 5.6% weighed less than 50.0 mg. The male woodcock appears to be an unusual temperate migratory species in completing spermatogenesis prior to spring migration. Further research should study the male on the northern breeding areas to more fully understand its reproductive physiology.

MATTHEWS, JAMES F. University of North Carolina at Charlotte--Annual vs perennial--classical botany vs species biology.

During an investigation into the species biology of the endangered Ranunculus subcordatus, the question arose as to the duration of this species in relation to its description and behavior in nature. This triggered an even broader consideration of the use of the terms annual and perennial in descriptions and in key construction. An analysis of the genus and species keys in the Manual of the Vascular Flora of the Carolinas showed these contrasting features were used in the keys to genera in the Brassicaceae (once), Asteraceae (twice) and Lamiaceae (three times). However the same couplet, annual vs perennial, was used 35 times in the keys to species throughout the Manual. Examples will be drawn from these for comments on the classical botanical use of the terms vs their occurrence in nature, along with their applicability as key characters.

MAURAKIS, E. C.,¹ A. F. HORNE,² R. E. JENKINS,³ R. W. WATSON,⁴ and W. S. WOOLCOTT.² The George Washington University,¹ University of Richmond,² Roanoke College³ and United States Army⁴--The effects of stream order on the longitudinal distribution of fishes in the Rappahannock River, Virginia.

A study was conducted to determine the effects of stream order on the longitudinal

distribution of fishes in the Rappahannock River, Virginia. Six stream orders (1,2,3,4, 5 and 6) in four zones (A, B, C and D) delineated by physiography of the drainage system were identified. Eighty-five species (62 freshwater, 23 marine) and five hybrids were identified from 365 collections. Mean number of species from collections of combined zones ranged from 18.8 in stream order 1 to 41 in stream order 3. Cyprinidae (22) and Centrarchidae (12) were the most speciose families. Rhinichthys atratulus was collected the most frequently; Lepomis macrochirus was most ubiquitous, occurring in all orders and zones except one (stream order 1, zone B). Significant correlations were found in mean number of species between zones A and B; and C and D; however, the correlation of the numbers of species from combined headwater zones A and B and combined zones C (Piedmont) and D (tidal) were not significant. In comparison of the fauna of stream order 1 to increasing stream orders, similarity index values decreased with increased stream order. In comparing the fish fauna in a continuum along the course of the river, similarity index values of species composition increased with increasing stream order with highest values in orders at positions three and four. The species list in the Rappahannock was more similar to that of the York River than it was to any other major western tributary of Chesapeake Bay. University of Richmond and Sigma Xi grants supported the study.

MAURAKIS, EUCENE C. and JULES J. LOOS.

The George Washington University and Potomac Electric Power Company--Nest building and spawning of Semotilus lumbee (Pisces: Cyprinidae).

Semotilus lumbee is endemic in the Carolina Sandhills. Spawning nests of S. lumbee, previously unknown, are similar to those of Semotilus atromaculatus (i.e., pit-ridge type). In April, 1983, five spawning events were observed in a 2-m wide first-order stream. The male attending the nest swam side-to-side between lateral crests of the pit just before the female assumed a position at the head of the pit. The male aligned the female in the region between its pectoral and pelvic fins by strongly arching its body laterally toward the female whose belly faced the male when gametes were released. After spawning, the male picked up pebbles from the posterior portion of the pit and deposited them on newly fertilized eggs. Conspecific aggressive behavior in the form of short lunges was exhibited by the attendant male. This study was supported, in part, by a grant from The George Washington University Chapter of Sigma Xi.

MCDARBY, MICHAEL B., LEWIS B. COONS, and WALTER E. WILHELM. Memphis State University--Ultrastructural morphology of Capillaria catostomi Pearce.

Capillaria catostomi is an intestinal parasite of several species of freshwater fish. Specimens were obtained from Notemigonus

chryssoleucas, a minnow, and prepared for observation by both transmission and scanning electron microscopy. Comparisons were made with Capillaria hepatica, a parasite of mammalian liver, from papers published by K. A. Wright, in such structures as the cuticle, spicule, hypodermis, somatic muscle, esophagus and stichosome, cephalic sense organs, and bacillary band. Remarkable similarities were found in these structures between the two species, indicating either the flexibility or the irrelevance of these structures in adapting to two very different microenvironments.

MCDEARMAN, WILL, W. Mississippi Museum of Natural Science--Systematics of *Zigadenus densus* and *Z. leimanthoides* and phylogenetic implications of breeding systems in the Veratrae.

Zigadenus leimanthoides Gray and *Z. densus* (Desr.) Fernald have historically been treated as distinct species, recognized solely on the basis of inflorescence type; a single raceme with perfect flowers in *Z. densus* versus a panicle of racemes with terminally staminate flowers in *Z. leimanthoides*. In south Mississippi, the species occur intermixed in populations with intermediates expressed in inflorescence type. Mean percent seed set/flower from 23 cross-pollinations between taxa was 74.2. Staminate flowers were present on both species. Biomass allocation was determined for leaves, stems (including bulbs), and flowers for 31 plants. Number of flowers produced and inflorescence type were correlated with leaf, stem, and total above ground biomass. *Zigadenus densus* and *Z. leimanthoides* represent but one species, *Z. densus* by nomenclatorial priority, in which plants produce racemes or panicles depending upon biomass (age?) and resources available for reproductive allocation. Related studies with *Z. glaberrimus*, *Z. elegans*, *Veratrum californicum*, and *Melanthium virginicum* reveal a unique pollination mechanism characterized by protandry and the movement/exchange of anthers and stigmas at a position above the perianth glands required for pollinator contact. Anthers and stigmas are stationary in *Amianthium muscaetoxicum* and *Z. densus*. These and additional breeding system nomologues are the subject of a cladistic study for the Veratrae. Hypotheses formulated include 1) *Zigadenus*, with *Z. densus*, is a paraphyletic group, and 2) stationary anthers/stigmas are plesiomorphic and movement is apomorphic in the Veratrae.

MCDONALD, CHARLES B. and ANDREW N. ASH. East Carolina University and Gardner-Webb College--Pocosins, changing wetlands in North Carolina's coastal plain.

Pocosins are shrub bog freshwater wetlands. They are found from Virginia to Georgia but occur most extensively in the North Carolina coastal plain where they once occupied over two million acres. Most pocosins have developed on flat, poorly drained uplands. Their vegetation is characterized by open to

closed stands of pond pine (*Pinus serotina*) overtopping dense shrubbery that may include titi (*Cyrilla racemiflora*), honeycup (*Zenobia pulverulenta*) and fetterbush (*Lyonia lucida*). Soils range from mineral stained with organic matter to deep organic. In recent years, natural pocosins have been converted extensively to row crop agriculture, managed forestry and peat mining. Available information on the magnitude of these changes and their possible consequences was consolidated for the U.S. Fish and Wildlife Service. The impacts include: altered patterns of water movement that may effect salinity regimes in estuarine marsh nursery areas; soil losses from erosion, subsidence, fire and peat mining; air pollution from land clearing operations, peat fires and wind erosion; water pollution from nutrients, pesticides, and bacteria; and, wildlife habitat reduction.

McLEOD, KENNETH W. Savannah River Ecology Laboratory--Nutrient conservation in fertilized loblolly pine forests.

Southeastern coastal plain soils have low nutrient holding capacities. Consequently, vegetation on these soils is dependent on a continual nutrient release and not extraction of nutrients stored in the soil. This can be observed by the short life span and high dependency on inorganic fertilizers in SE agricultural systems. Thus, nutrients added in fertilizers must be quickly retained by the vegetation or be lost. Organic fertilization of loblolly forests with liquid sewage sludge has shown to increase, by 75%, the nitrogen flux from the canopy to the forest floor. This is due to both increased N concentration in throughfall and litterfall and greater mass of litterfall. The increased nitrogen flux is being absorbed by increased needle and understory production, both with greater N concentrations. Thus, the N introduced by the fertilization has been stored in system compartments from which nutrient turnover is relatively slow, extending the nutrient subsidy much past the initial application.

MELlichamp, T. LAWRENCE. University of North Carolina at Charlotte--Pollination and fruit production in Conjurer's Nut in North Carolina.

Nestronia umbellula (Santalaceae) is a rare, dioecious, clone-forming, hemiparasitic shrub found in dry pine-oak woods throughout the Piedmont from Virginia to Alabama. Little has been known about its reproductive biology that would help explain its rarity. Its pollinator was unknown and mature fruits were not seen. Male and female populations rarely grow together, and the woods where they grow are becoming more disturbed and isolated. Yet, we continue to find additional populations that seem to be maintaining themselves

quite well. Hand pollination resulted in a low seed set of 5% in 1982, while natural pollination resulted in about 4% seed set (each fruit has one seed). The amount of fruit produced varies from year to year and place to place. The pollinator now appears to be a small nocturnal moth. We do not know the fruit dispersal agent, but it is probably a rodent that eats the outer fleshy part of the drupe. Young fruit may be heavily fed upon by moth larvae the severity of which varies remarkably between localities. Germination of seeds seems to require a double dormancy. The reasons for its rarity may not be obvious. Do we need to worry about Nestronia?

MIDDENDORF, GEORGE A. and MURIEL E. POSTON, Howard University.--Fruiting phenology in raspberries: Energy availability and implications for frugivore foraging strategy.

Patterns of fruit presentation in two populations of Rubus pennsylvanicus were studied in order to determine the relationship between reproductive resource allocation and frugivore foraging. Flowering occurred in late May and early June. Approximately 53.1% of flowers set fruit. Fruiting periods lasted about five weeks, from late June through early August 1983. The length of time individual fruits were available for consumption was far less; maturation times for individual fruits varied from two to five weeks, with a peak in mid-July. During this period fruits underwent a series of color changes directly correlated with maturity. Energy content for each maturation stage was assessed through bomb calorimetry. Energy available to frugivores was calculated on the basis of energy per fruit for each maturity class times the numbers of fruit per class throughout the fruiting period. Analyses of reproductive resource allocation shows that while fruit set is similar for both populations, the ratio of vegetative to fruit production is higher in early successional habitats. This difference appears to be due to both an increase in frequency of fruit abortion and an increase in vegetative reproduction.

MILLER, CHARLES E. and DANIEL P. DYLEWSKI. Ohio University, and Virginia Polytechnic Institute and State University.--The fine structure of *Ligniera verrucosa*, an endoparasite of *Veronica persica*.
Ligniera verrucosa Maire and Tison, a member of the Plasmodiophoromycetes, was examined

using light and transmission electron microscopy. Plasmodia, sporangia, and cystosori of the parasite were observed within the root hair and epidermal cells in the root system of *Veronica persica* Poir. Plasmodia were pleomorphic, multinucleate and contained numerous types of membrane-bounded vesicles and vacuoles. The vacuoles were $\bar{x}=4.1 \mu\text{m} \times 2.0 \mu\text{m}$ in size, contained a fine fibrillar-like matrix and appeared to be morphologically unique among the Plasmodiophoromycetes. Sporangia were pleomorphic and consisted of numerous lobes. Each lobe was spherical overall, $\bar{x}=5.3 \mu\text{m}$ in diam. and contained 7 to 2 ($\bar{x}=5$) zoospores. The zoospores were biflagellate, and escaped from the sporangium by swimming from one lobe to another and finally through a peripherally situated exit lobe which functioned in the perforation of the host cell wall. The uninucleate cysts of *L. verrucosa* were $\bar{x}=3.8 \mu\text{m}$ in diam. and found in groups of 2 to 15. The walls of contiguous cysts were fused, and ornamented on their external surfaces. Although the developmental stages in the life cycles of plasmodiophorous taxa share basic morphological similarities it appears that each species is cytologically unique and distinguishable at the ultrastructural level.

MILLER, DAVID E. University of South Florida.--Foraging and natural history of an estuarine water snake, *Nerodia fasciata compressicauda*.

A field study of a single population of the mangrove water snake was performed from March to October in 1983. Categories for the various color morphs were constructed; the frequency of encounter of various morphs was recorded. A mark-recapture technique was used to estimate population size. The number of snakes having injuries was also recorded. Prey species were determined by forced regurgitation. *Poecilia latipinna*, *Fundulus grandis*, *Fundulus similis*, and *Cyprinodon variegatus* were the major species eaten. Total length, width, height, and girth of the prey were regressed in allometric fashion with head measurements, snout-vent length, and weight of the predator to describe ontogenetic changes in the size of prey selected. Laboratory experiments were also conducted in which various size classes of *Fundulus sp.* were presented to the predators at high densities. Similar head and body measurements were analyzed in allometric fashion for comparison with the field data. Prey availability was estimated by seine samples, and electivity indices were computed. Home ranges of recaptured snakes were also calculated. An unusual rain-water drinking behavior was observed which is apparently adaptive to the snakes' saline environment.

MILLICAN, TROY and JIM PENNINGTON.
Southeastern Louisiana University
and U.S. Army Engineers, Vicksburg--
Biological impacts of dike field
disposal in the Arkansas River.

During October 1982, disposal of dredged material in an Arkansas River dike field (river miles 95.2-96.1) was conducted by the U.S. Army Engineer District, Little Rock. The purpose of the dredging was to restore project depths and widths of the navigation channel. Approximately 50,000 cubic yards of material was dredged and placed in the disposal area. The study site was divided into four areas: (1) area of high impact, (2) area of moderate impact, (3) area of low impact, (4) reference area. Physical, chemical, and biological samples were collected from each area immediately prior to and after disposal and at intervals to document seasonal changes and recovery. Dominant substrate types were classified as medium sand, fine sand, silt-clay. Major physico-chemical parameters such as dissolved oxygen, temperature, and conductivity were considerably lower in all areas during January sampling. The average number of taxa in the reference area decreased from 9.2 (October) to 2.53 (January); in low impact area from 9.4 (October) to 2.31 (January); in moderate impact area from 8.4 (October) to 2.71 (January); in high impact area from 10.4 (October) to 1.14 (January). Effect of disposal was also significant on total density in high impact area, 39.3 in October to 23.47 in November.

MOBLEY, RONALD W., GROVER C. MILLER, and JOHN F. ROBERTS. North Carolina State University--A Preliminary Survey of Monoclonal Antibody Production Against Schistosoma of Schistosoma mansoni.

Two groups of 3 BALB/c mice were cutaneously exposed to 500 irradiated (50 KR) cercariae per mouse. Group 1 mice were re-exposed to 500 irradiated cercariae 4 wks. later. All mice were challenged with 200 normal cercariae 6 wks. after the initial exposure and killed 7 days later. The spleen cells from the mice in each group were pooled and fused with P3/x63-Ag8 myeloma cells. Hybridomas were cultured and later screened for anti-schistosomal antibody production. The objectives are: 1) determination of the relative efficacy of the two exposure regimens, and 2) characterization of anti-schistosomal antibodies.

MOORE, JOHN T. and JERRY L. WEST.
Western Carolina University--
Relationships between suspended solids
and trout standing crop biomass and
recruitment in selected Western North
Carolina streams.

Four Jackson Co., NC streams, Wolf, Mull, Moses, and Dick's Creeks, were selected due

to their similarity in characteristics and differences in suspended solids loads. Mull and Wolf Creeks have low concentrations of suspended solids and were used as control streams. Mull Creek was compared to Dick's Creek and Wolf Creek was compared to Moses Creek. All of the streams have native or naturalized trout populations and, with the exception of Dick's Creek, are located on U.S. Forest Service land. Four suspended solids samples were collected from each creek biweekly with more frequent samples during high discharge. Population estimates of both trout and non-trout were determined quarterly using a depletion technique. Age structure of the trout populations was also determined. Quarterly fish samples were compared to determine recruitment and to estimate mortality. Attempts were also made to determine relationships between suspended solids and trout populations. A summary of the data follows:

Creek	Susp. Sol (mg/l)	Dis. (m ³ /sec)	Tr. density (#/100 m)
Wolf			
mean	4.92	1.038	76
range	.53-11.44	.461-3.376	39-127
Moses			
mean	19.99	0.688	16
range	2.21-171.77	.342-1.31	4-37
Mull			
mean	8.67	1.311	32
range	1.45-21.45	.322-2.268	17-27
Dick's			
mean	32.63	0.7585	22
range	1.38-658.06	.304-1.870	14-32

MORTON, DAVID and BRUCE GREGORY CHIN.
Frostburg State College and Wright State
University--Increase in the chemotactic
activity of rat serum after parenteral
administration of iron.

When rats are fed a diet high in iron or are administered parenteral iron (e.g., iron dextran, ip), macrophages containing histochemically demonstrable iron appear in their gastrointestinal connective tissues. In rodents, at least, macrophages are derived from circulating monocytes. In order to test the hypothesis that some chemotactic substance was involved, the chemotactic activity of rat serum for peritoneal macrophages, induced by mineral oil, was measured using the Leukocyte Migration Agarose Test. Sera was collected from normal rats, and 3 experimental groups of rats 3 days after injection of either iron dextran (25 mg Fe, ip) or an equivalent amount of dextran alone (60,000-90,000 or 100,000-200,000 daltons). The chemotactic index of migration toward the sera from the iron dextran loaded group was significantly higher than that of the other 3 groups which were not significantly different between themselves (Duncan's multiple range test, $p < 0.05$). This result does indicate that there is an increased chemotactic activity in the blood 3 days after parenteral iron loading. However, it does not indicate that the blood is the site of its action as the serum may be considered a sampling pool of substances present in the body but not necessarily evenly distributed throughout the body.

MURPHREE, CHARLES S. Middle Tennessee State University--
Scanning electron microscopical study of cuticular features of selected arachnid taxa.

Surface features can be observed on the cuticle of all arthropods at both the macroscopic and microscopic level. The cuticle is usually patterned with parallel ridges, elevated protuberances and various other geometric shapes which are sufficiently small to warrant the term "microsculptures." Some cuticular patterns are described in taxonomic papers, especially for groups routinely examined with a compound microscope. Recent use of the scanning electron microscope for descriptive purposes has made the study of arthropod ultrastructure useful in distinguishing differences among certain taxonomic groups. In the past, ultrastructural studies of the external features of the arthropod integument have been primarily limited to the insects. This paper utilizes scanning electron micrographs to illustrate the relevant features of selected arachnid taxa and to compare the similarities and differences among these taxa.

Neiswender, John B., H. Delano Black, and Neil A. Miller.
Memphis State University---Native ectomycorrhizal fungi and the growth of outplanted Pinus taeda.

Six pairs of *Pinus taeda* in an experimental seed orchard at Meeman Biological Station were examined to determine if the relative amounts of mycorrhizal infection present on their root systems has had a differential effect on their growth rates. Pairs of large and small trees of the same age growing in close proximity were chosen. The tips of young branch roots were dug up and examined with scanning electron microscopy to determine the amount of mycorrhizal infection. Then each pair was compared for any differences in the degree of infection. The results of these comparisons indicated that the larger trees had significantly greater infection than the smaller ones. The larger trees had fungal hyphae present on over 75% of the root tips examined and thick mantles of hyphae were commonly seen. In contrast, the smaller trees had infections on less than 30% of the root tips sampled and most infections were sparse. No robust mantles were observed. In conclusion, the degree of infection by mycorrhizal fungi is correlated with increased growth rates in *Pinus taeda*.

NESOM, GUY L. Memphis State University--
Phylogeny of Chaptalia sect. Chaptalia and the origin of C. tomentosa.

Chaptalia tomentosa, the Gulf Coastal Plain sunbonnet, is the type species of sect. *Chaptalia*, which is distinguished by sterile ovaries and ligules with purple midstripes below. The other six species of the section (three of them newly recognized) occur in the eastern Sierra Madre and mountains of southeastern Mexico as far as Chiapas. A cladistic analysis of the section shows the southeastern U.S. endemic to be the sister taxon of a montane species that ranges from central Nuevo Leon to Hidalgo. This pattern of vicariance is known from numerous other taxa of diverse groups, but the time of divergence is difficult to determine exactly. A basal trichotomy in the cladogram has two plausible resolutions, based on evidence from geographic distributions, and only a single species is responsible for the lack of consistent dichotomies. Outgroup choice is not perfectly clear and parallel variation in possible sister groups makes determination of character state polarities problematic, but the branching configuration remains essentially stable with several alternatives. One choice from the closely related genus *Gerbera* completely resolves the cladogram in near congruence with one derived from a choice within *Chaptalia* but reverses several of the polarities.

NESOM, GUY L.¹ and VERNON M. BATES.²
Memphis State University¹ and The Harvard University Herbaria²--A phylogenetic reconstruction of Polygonella.

Using reexamined data from Horton (1963) and original observations of other features, qualitatively different character states could be identified for 26 characters of the 11 species of *Polygonella*. Haraldson (1978) identified the probable sister group of *Polygonella* as *Polygonum* sect. *Duravia*; our study of this group has allowed polarization of many of the morphoclines within *Polygonella*. A preliminary reconstruction of the phylogeny of the genus has been produced by an initial cladistic analysis and following FIG/FOG analyses. *Polygonella fimbriata-robusta* is confirmed as the sister group to the other nine species; two additional groups are formed by *Polygonella articulata-parksii-americana-myriophylla* and *P. macrophylla-polygama-gracilis-basiramliaciliata*. Original chromosome counts from *P. americana* and *P. myriophylla* are $n = 18$, a previously unknown level for the genus; when overlaid on the cladogram with chromosome numbers from eight species reported by Horton, they demonstrate that parallel losses of chromosomes have occurred in each of the three lineages within the genus. Trends in evolution from a perennial to annual duration and from hermaphroditic to unisexual flowers also are clearly documented. Congruent geographic distributions among several pairs of vicarious taxa suggest that evolution in each of the lineages has been synchronous.

OSBURN, M. VIRGINIA and DAVID G. LINDQUIST. University of North Carolina at Wilmington--Population dynamics and feeding ecology of the sheephead, Archosargus probatocephalus.

Population numbers of sheephead were determined between 1980 and 1982 from visual 50 m transect counts on two jetties at Masonboro Inlet, North Carolina. The mean numbers of sheephead at the newer, shallower south jetty built in 1980 were significantly higher than at the older north jetty which was built in 1966. Comparing the inlet and ocean sides of the older north jetty, there were no significant differences in the population numbers at the mid-depths (2-3 m) nor near bottom depths (5 m). However, when comparing between the mid-depths and near bottom depths, the mean number of sheephead were significantly higher at the mid-depth zones of the north jetty. The fact that the shallower south jetty and mid-depth zone of the north jetty had a significantly higher population number is probably due to the food resources available to sheephead at these shallower depths. Preliminary gut analyses show that the larger individuals appear to be selecting scorched mussels and barnacles along with some algae. Rock scrapings off the north jetty at different depths indicate that the barnacles and mussels are living in algal mats at the upper depth zones. Therefore, sheephead are utilizing the shallower habitats of the jetties where their preferred food items are found. Gut analyses of smaller and a few larger individuals also show that epiphytic red and green algae were the primary food items in their diet. Stomachs of all sheephead were found to be full during all times of the day, indicating that they are "roaming feeders" which feed continually during the day. These data indicate that these jetties are providing a rich substrate-attached food source for sheephead.

OURTH, DONALD D. Memphis State University --Lack of Bactericidal Humoral Immunity to Serratia marcescens by the Tobacco Budworm Larva, Heliothis virescens.

Serratia marcescens is an important bacterial insect pathogen, and the tobacco budworm larva (Heliothis virescens) is an important insect pest of cotton and other crops. No bactericidal humoral immunity to S. marcescens could be detected in cell-free hemolymph from tobacco budworm larvae. This was true for hemolymph obtained from uninoculated larvae and for hemolymph obtained from inoculated larvae at 24 hours post-inoculation of heat-killed S. marcescens. Certainly S. marcescens is a good insect pathogen if no humoral immunity is produced after inoculation of dead bacteria. The possibility then exists that certain strains of S. marcescens could be applied to plants and used as microbial insecticides against this lepidopterous larva.

OYOFO, BUHARI A.¹ JOHN E. MAYFIELD¹ and DANIEL M. SCHMITT.² Atlanta University¹ and Northeastern Forest Experiment Station² --Effects of budworm, Choristoneura fumiferana, herbivory on balsam fir, Abies balsamea, bud at the ultrastructural level.

Electron microscopic analysis of buds from check areas and those with a four year defoliation history disclosed distinctive differences in frequency of Golgi bodies, proplastids and other ultrastructural features. These differences are discussed in terms of possible metabolic disturbances incident to continuous budworm attack.

PARKER, JAMES C. North Georgia College--Surveillance of gray squirrel parasitism in northern Georgia.

An ongoing project has been undertaken to study parasitism in the gray squirrel, Sciurus carolinensis. The objectives include: determining which parasite species occur here; monitoring numbers, frequencies, and other parameters; studying host effects of parasitism; and collecting specimens for additional studies. The examination of 24 hosts yielded 6 protozoan species, 8 helminth species (7 nematode; 1 cestode) and 6 of ectoparasites. The protozoa were Hepatozoon griseisciuri (100%), Eimeria sp. (100%), E. ontarioensis (8%), E. confusa (4%), Trichomonas sp. (8%), and Giardia sp. (8%). The nematodes were Citellinema bifurcatum (75%), Heligmodendrium hassalli (66%), Strongyloides robustus (58%), Bohmiella wilsoni (17%), Enterobius sciuri (13%), Trichostrongylus calcaratus (4%) and microfilaria (4%). The cestode Hydatigera taeniaeformis (13%) was encysted in the liver. Ectoparasites included Neohaematopinus sciuri (33%), Orchopeas howardii (21%), Haemogamasus reidi (17%), Cuterebra sp. (8%), Hoplopleura sciuricola (4%), Enderleinellus longiceps (4%). The occurrence of Trichomonas sp. is a new host record; whereas H. taeniaeformis (previously reported as Taenia taeniaeformis) and Giardia sp. are new distribution records for Georgia. This study has been supported by NGC Office of Faculty Development.

PARR, PATRICIA DREYER and GEORGE E. TAYLOR, JR. Oak Ridge National Laboratory- Influence of relative humidity in modifying plant response to trace sulfur-containing gases.

Sulfur-containing trace gases of a wide variety of types commonly occur in the atmosphere. Although much is known concerning the environmental fate and effects of sulfur dioxide (SO₂), comparable data for other sulfur-containing gases are limited. The purpose of this research was to evaluate plant response (i.e., net photosynthesis) to SO₂, carbonyl sulfide (COS), and hydrogen sulfide (H₂S) under

contrasting relative humidity regimes. Soybean (*Glycine max*) plants were exposed to each gas individually for 72h at concentrations ranging from 0 to 30 $\mu\text{mol}/\text{m}^3$ at 40 and 70% relative humidity. Net photosynthetic (P_N) rates as a percent of controls varied significantly among gases and humidity treatments. At both humidity regimes, the effects of H_2S and SO_2 on P_N were equivalent and more pronounced than that of CO_2 . The high relative humidity during exposure significantly increased the effects of all three gases on P_N depression. Research sponsored by the Office of Health and Environmental Research, U.S. Department of Energy, under contract W-7405-eng-26 with Union Carbide Corporation.

PATERSON, ROBERT L. Frostburg State College--Geographic variation in the nest sites of Black-throated Blue Warblers.

Forty-two nest sites were analyzed to quantify variation among 3 locations in the Appalachian Mountains. Sixteen variables were measured at each nest. Ten of these variables were measured at 25 random sites. Those measured within 1 m of the nest were microhabitat variables and those measured within a .04 ha circle were macrohabitat variables. Nests were found in 4 understory vegetation types, each associated with 1 or more of the locations. The variation among locations indicated no geographic trends. Macrohabitat variables describing importance of 3 tree types indicated differences among locations. This was also reflected in the significantly higher vertical foliage density at nests located in birch and spruce forests. Nests placed in spruce and rhododendron understory had high birch and spruce importance values (IV) and low deciduous tree species IV. Where macrohabitat values were compared to data from randomly located sites, values were generally intermediate to the nest site values. Microhabitat values showed less variation than macrohabitat values. Nest heights were significantly higher in rhododendron than in hobblebush. This was not an effect of the taller growth habit of the rhododendron as the ratio of nest tree height to nest height was greater in the rhododendron than in the hobblebush. These data suggest Black-throated Blue Warblers are responding to factors other than relative position in the understory when selecting nest sites. Little quantified data exists on nest site variation of forest dwelling passerines in different parts of their range. These data should provide information and stimulate interest regarding variation in nest site placement of passerines.

PATTON, SHARON and SANDRA STRAWBRIDGE JOHNSON. University of Tennessee--Preliminary survey for *Toxoplasma* antibodies in dairy goats.

In January 1983 serum was obtained from two dairy goats that had

recently aborted. Both goats had positive titers (1/4096, 1/256 respectively; 1/64 minimum positive titer) to *Toxoplasma gondii* by the microtiter indirect hemagglutination (IHA) method. Subsequently, serum samples were obtained from 30 additional female dairy goats from 3 farms and tested for antibodies to *T. gondii*. Of the 30 goats tested, 83% were seropositive. Although a definite correlation cannot be established, it is interesting to note that several of these goats had histories of abortions and other reproductive difficulties. Also, 2 wethers that nursed a seropositive dam (titer 1/64) were also tested; both were seropositive (titer = 1/4096). It is possible that these wethers were lactogenically exposed to *Toxoplasma*.

PECHMANN, JOSEPH H. K., and REBECCA L. SCHNEIDER. Savannah River Ecology Laboratory--The spatial distribution of migrating amphibians around a breeding site.

The spatial distribution of immigrating and emigrating amphibians around a breeding site in South Carolina was studied using a drift fence with pitfall traps. Migrations of 9 species were monitored continually over 5 years. The spatial distribution of migrating individuals varied among species and among years. Differences within species among immigrating adults, emigrating adults, and newly metamorphosed emigrating juveniles were also observed. Migrations of some species followed relatively narrow, well-defined corridors, whereas those of others took place along broad corridors. Some species showed no preference for any particular migratory pathways. Topography is one factor which appears to influence the spatial distributions of migrating amphibians.

PERRY, JAMES W. Frostburg State College--Structure of microsclerotia of *Verticillium dahliae* in roots of Russet Burbank potato plants.

Microsclerotia of *Verticillium dahliae* in potato (*Solanum tuberosum*) roots were examined, primarily with the transmission electron microscope. These resting structures were found in all tissues except the xylem, even though the tracheary elements of some microsclerotium-containing roots were infected. Occasionally present within nine days of inoculation, they became more numerous with time. Usually, the microsclerotia consisted of a peripheral region composed of degenerate hyaline cells and an inner region of pigmented cells with cytoplasmic contents of varying electron density. Melanin coated cells in both regions but usually was more abundant over the pigmented cells. Roots containing

large microsclerotia were moribund. Several living roots contained small resting structures, some of which produced penetration hyphae. Living host cells responded to attempted penetrations by producing lignitubers which ensheathed the penetration hyphae.

PINDER, J. E., A. C. DOSWELL, D. C. ADRIANO, T. G. CIRAVOLO, and D. M. YEHLLING. Savannah River Ecology Laboratory--Interception and retention of Pu-238 by orange trees, Citrus sinensis.

Electrical power for the Galileo and International Solar-Polar spacecrafts will be provided by Pu-238 fueled radioisotope thermoelectric generators (RTG) similar to those employed on Voyager and Pioneer missions. Because of the remote possibility that an accident during the launch could disperse RTG fuel into the atmosphere over central Florida, we have been conducting research on the potential dose-to-man resulting from the deposition of Pu-238 on orange trees. Plutonium on fruit surfaces could be transferred to edible portions during peeling or incorporated into products flavored with processed orange peels. Orange trees intercept only a small fraction of the Pu-238 deposition; however, once the Pu-238 has been intercepted it is retained for > 40 days. Plutonium on the surfaces of orange fruits is not readily removed by washing.

POST, BARBARA J. University of North Carolina at Charlotte--Species biology of Coreopsis latifolia Michaux.
Coreopsis latifolia Michaux (Broad-leaved tickseed) is a rhizomatous herb endemic to the Carolina mountains and considered endangered by the N.C. Plant Protection Program. Reproductive and pollination biology hold special interest in considering reasons for the rarity of this species. The functional pollination system, seed set and germination and seedling survival are being studied. Data for seed set and germination taken from co-occurring and flowering, yellow composites are being used for comparison with the same data for *C. latifolia*. Other points to be discussed include the possibility of apomixis, the role of disturbance in the establishment of populations and management practices for the protection of the species.

POSTON, MURIEL E. AND STANWYN G. SHETLER. HOWARD UNIVERSITY AND SMITHSONIAN INSTITUTION -- Systematic Importance of seed surface features in Caiophora (Loasaceae subfamily Loasoideae). Scanning electron microscopy of seed coat microsculpturing of representative taxa in *Caiophora* has elucidated six seed coat types which correlate with taxonomic subgroups and provide key characteristics

for differentiating problematic taxa at the sub-generic level. In all of the sections the outer cells of the seed coat from a reticulate pattern, however, differences occur in the degree of collapse of the outer tangential wall. Additionally, the inner tangential wall and radial wall surfaces show patterns from smooth to reticulate to striate to tuberculate and these patterns provide a distinctive array of features which serve to characterize the infrageneric subgroups. Section *Angulatae* which is biogeographically disparate within the genus also has a distinctive seed surface microsculpture which retains both its outer and inner tangential wall unlike the other sections of the genus. Seed coat features support morphological and cytotaxonomic evidence which indicates that *Caiophora* is phylogenetically distinct within the Loasoideae.

POTTER, DAVID M., LAURA F. HUENNEKE and REBECCA R. SHARITZ. Savannah River Ecology Laboratory --Distribution and abundance of Taxodium distichum (L.) and Nyssa aquatica (L.) seedlings in a floodplain receiving thermal effluents.

We examined seedlings of *T. distichum* and *N. aquatica* in a floodplain forest of the Savannah River Plant, South Carolina. Portions of the forest receive thermal effluents only when the entire floodplain is inundated during seasonal flooding. These areas continue to be dominated by *Taxodium* and *Nyssa* although the canopy has been reduced. Seedlings of these species were located using one meter wide belt transects. Eight transects were randomly located perpendicular to the effluent stream traversing the floodplain from the upland boundary to the channel's edge. Water and soil temperatures were measured in August 1983 at several random locations along each transect to describe thermal regimes. *Taxodium* (1,107) and *Nyssa* (288) seedlings were mapped to allow relocation of individuals. Presence of cotyledons, incidence of grazing, apical dieback and seedling microhabitat were also recorded. Mean soil and water temperatures at every transect were within tolerance levels for establishment and growth of the seedlings. Mean seedling densities over all transects for *Taxodium* and *Nyssa* were 1.29 and 0.29 per square meter, respectively. We describe variations in temperature, water depth, seedling density and growth among and within transects. Continued long-term monitoring of these seedlings will provide survivorship data.

PRICE, RICHARD E. U. S. Corps of Engineers, Vicksburg District--Analysis of water quality using historical aerial photography.
Several oxbow lakes of the lower Mississippi Valley suffer from excessive turbidity. This

problem for the most part is a result of extensive clearing and farming of the watersheds which drain into the lakes. In the investigation of the relationship between the watershed and the lake, a knowledge of the development of turbidity conditions over time would be beneficial. Most lakes of this region have not been monitored on a regular basis and if turbidity data is available, it usually consists of one set of samples at one point in time. A method of obtaining a historical record of the turbidity for a lake was developed using historical aerial and satellite photography. Aerial photography has been used for almost 50 years in the assessment of low water and flood events. Due to proximity of most oxbow lakes to a river, most are covered in these flights. By examination of available aerial and satellite photography for a relatively long period of record not only can one obtain the progression of watershed development but also the relative water quality associated with each period.

RABITO, FELIX and DAVID C. HEINS. Tulane University -- Reproduction of the weed shiner, *Notropis texanus* (Girard), in the Choctawhatchee River.

The reproduction of the weed shiner, *Notropis texanus*, in the Choctawhatchee River in northwest Florida and southern Alabama was studied from 1974-1977. In 1974, reproduction occurred from middle February - late August or early September. Data from other years support these observations. Fecundity and the size of mature eggs will also be discussed.

REAGAN, NANCY L. and JERRY L. WEST. Western Carolina University--Life History of the Mottled Sculpin in a Western North Carolina Stream.

Aspects of the life history of *Cottus bairdi* Girard, the mottled sculpin, were examined in a population from Caney Fork in Jackson County, North Carolina during the spring of 1982 and 1983. Sculpin were anesthetized in Chlorotone and measured for total length (TL) and standard length (SL) to the nearest mm. Individuals were sexed by dissection. Egg counts were made for gravid females and diameters of mature ova were measured to the nearest 0.05 mm. Size-frequency histograms constructed showed two obvious groups. One of these was comprised of juveniles and the other was composed of mature males and females. Juveniles ranged in size from 26-38 mm SL, mature females from 41-69 mm SL, and mature males from 44-80 mm SL. Both sexes appear to mature at the end of their second year. On the average males are larger than females and exhibit a greater range of sizes. The number of eggs present in gravid females ranged from 35-107. The number of eggs produced by a female was found to be positively correlated with SL ($r=0.8048$, $p<0.001$, $N=69$). The regression equation describing fecundity is $Y=-54.698 + 2.208 \text{ SL}$. Average diameter of mature ova

was 3.01 mm (SD=0.1315 mm, Range: 2.77-3.17 mm, N=70 ova). Spawning in 1982 occurred prior to 9 April, and in 1983 it began after 25 March and was completed by 11 April. On 1 April 1983, of 16 females collected, 8 were still gravid and 8 were spent.

Reaves, Jimmy L. and John E. Mayfield. Atlanta University -- Effects of *Trichoderma viride* filtrates on *Armillaria mellea* in liquid culture.

Trichoderma viride culture filtrates were tested for antagonistic effects on *Armillaria mellea* in liquid culture. Filter sterilized filtrates were added to flasks containing *A. mellea* and malt extract medium at a concentration of 50% (v/v) 0, 5, and 10 days after inoculation. The flask were incubated for 21 days in the dark at 25°C on a rotating shaker (150 rpm). *A. mellea* formed mycelial pellets in both the *T. viride* and control flasks. The flasks containing filtrates from *T. viride* consistently formed partially melanin-like covering around the pellets compared to a completely melanin-like covering around the pellets in flask devoid of the filtrates. The observed effects of the filtrates appeared to be independent of time of application. Only when the filtrates were added at the time of inoculation was there a significant difference in dry weight of the pellets.

REESE, WILLIAM D. University of Southwestern Louisiana--Range and reproduction in *Syrrhopodon texanus* Sull. (Muscic), a North American endemic.

Syrrhopodon texanus Sull. is endemic to eastern North America, where it occurs primarily as two apparently allopatric populations, one on the Atlantic and Gulf coastal plains and the other in the interior. Most of the populations consist of female plants only; male plants and sporophytes are very rare and are confined to a few coastal plain sites where the sexes occur together. Reproduction in this moss is mainly by gemmae, which are produced with marked periodicity, mostly in the period August to January.

RENZAGLIA, KAREN S. and MARIE L. HICKS. East Tennessee State University, and Appalachian State University--Megaceros (Anthocerotae) in the Southern Appalachians.

A sterile hornwort, occurring in a restricted area of the southern Appalachians, has been identified as a member of the genus *Megaceros*, making this the first report of the genus in North America. *Megaceros* has its main distribution in the tropical/subtropical regions of the Southern Hemisphere. In the southern Appalachians it occurs in

Cherokee, Graham, Macon and Swain counties in North Carolina and in Sevier county in Tennessee. The range of the plant coincides with that of other endemic and disjunct bryophytes and probably represents a relict population. While identification to species has not been possible without sporophytes, detailed gametophytic characters indicate its position in the genus Megaceros. Growing primarily on submerged rocks in streams, this large plant is differentiated from other local hornworts by the presence of multiple chloroplasts in most thallose cells. In cross section the simple thallus, which lacks dorsal mucilage cavities, is composed of large internal cells, possessing from four to eight round chloroplasts and smaller epidermal cells with one to four chloroplasts. As in other Megaceros species, these chloroplasts lack discernable pyrenoids and contain scattered starch grains. Entirely devoid of antheridia, these female plants reproduce asexually through either regenerant formation or propagule production. This latter process involves the detachment of marginal fragments which are carried downstream, settle and germinate into new thalli. The success of these vegetative reproductive mechanisms is exemplified by the striking abundance of this plant in localized Appalachian regions.

REYNOLDS, THOMAS L. University of North Carolina at Charlotte--Metabolism of ribosomal RNA during growth and development of the male gametophyte of *Hyoscyamus niger*.

The pattern of RNA synthesis during growth and development of pollen grains of *Hyoscyamus niger* was studied using ^3H -uridine autoradiography. Incorporation of label during pollen maturation was periodic with peak RNA synthesis occurring in the uninucleate, nonvacuolate pollen grains and in the vegetative cell of the bicellular pollen grains. During the early stages of germination, isotope incorporation occurred predominantly in the nucleus of the vegetative cell with little or no incorporation in the generative cell. With the appearance of the pollen tube, incorporation of ^3H -uridine in the vegetative cell nucleus decreased and completely disappeared at later stages of germination. From a comparison of the results of this study with those of previous works on RNA synthesis during pollen embryogenesis in cultured anthers of *H. niger* it is concluded that in contrast to embryogenic development, there is no requirement for sustained RNA synthesis by the generative cell nucleus for normal gametophytic development.

RICHARDSON, LORENZO D.¹, ERIC L. MORGAN,¹ and R. C. YOUNG.² Upper Cumberland Biological Station (Tech Aqua)¹ and U. S. Tennessee Valley Authority--Fresh water mussels as realtime biosensors of water quality: applications in automated biomonitoring.

In meeting our objectives to include fresh water mussel physiological responses as

cause/effect criteria in water quality assessments, techniques for measuring bioelectrical activities of the heel splitter (*Properia laevis*) are developed and data management accomplished by an automated biomonitoring system. Cardio-vascular and myoelectrical responses are detected by a pair of probe-type electrodes, which in turn are connected to a specially designed variable gain amplifier. Signals generated are digitized for input to a 16 bit, Texas Instrument 9900 microcomputer for direct evaluation or filing. Using streamside facilities and a mobile laboratory to simulate selected water quality perturbations, physiological response, and system reliability are evaluated.

RITCHIE, JERRY C. USDA-ARS Hydrology Laboratory, Beltsville, Maryland--Sediment accumulation in delta lakes.

Studies have been made of the sediment accumulation in lakes along the Mississippi River from Lake Pepin in Minnesota to Lake Palourde in Louisiana. Sediment accumulation in the backwater areas along the upper Mississippi River ranges up to 3 and 4 cm per year, causing a significant reduction in open water habitat. Sediment accumulation in the oxbow lakes in the lower Mississippi River Delta can average 2 to 3 cm per year. Deposition in riverine lakes in the lower Mississippi Delta is also high. Deposition in the Lake Verret/Palourde near the Gulf of Mexico is also significant. The high rates of sediment accumulation in these natural lakes indicate the need for better conservation in upland ecosystems in the Mississippi River watershed if the open water areas are to be preserved.

RITKE, MARK E. Memphis State University--A preliminary phylogenetic analysis of the flickers (*Colaptes*).

A published phylogeny of the New World flickers (*Colaptes*) was in the form of a linear arrangement of species (Short 1972). Such an arrangement, however, does not establish a working framework in which to interpret phylogenetic history. The current study presents a phylogeny of *Colaptes* in the form of a cladogram based on previously published morphological and behavioral data. Polarities of character state transformation series were determined using the genus *Piculus* as the outgroup. Three main episodes of flicker phylogeny are apparent: the initial splitting and subsequent isolation of *C. atricollis* from the original ancestor; the evolution of the *C. punctigula-melanochloros-auratus* line; and the *C. fernandinae-pitius-capestris-rupicola* line. Cladistic relationships within *Colaptes* supported by the cladogram include: *C. auratus* as the sister species of *C. melanochloros*; *C. rupicola* as the sister species of *C. campestris*; and the Cuban endemic, *C. fernandinae*, sharing a most recent ancestor with the *C. punctigula-melanochloros-auratus* line. Certain aspects

of the cladistic relationships of Colaptes make it difficult to interpret a biogeographical history for the group, especially in light of current distribution patterns.

ROSS, JAMES W.¹, ROBERT H. SUEHISA², KENNETH H. KANESHIRO², and HARRY Y. YAMAMOTO². Benedict College¹, and University of Hawaii²--The addition of monogalactosyldiacylglycerol to chloroplasts: effects on some photochemical activities. Monogalactosyldiacylglycerol (MG) is the most abundant lipid in thylakoids but unlike the other thylakoid lipids, it does not form bilayers in aqueous suspension. This investigation showed that purified MG is also unique in being the only chloroplast lipid that adds to thylakoids without the aid of additional techniques to disrupt the membrane such as freeze-thaw or the use of detergents. The only detectable effect of this addition was the inhibition of proton pumping as seen by the inhibition of light-driven violaxanthin de-epoxidase activity, neutral red uptake, and 9-aminoacridine fluorescence quenching. There was no inhibition of the photosystems or electron transport, and no structural change was detected. Since this lipid can form hexagonal-II phase structures which have a central aqueous channel, it was concluded that MG binds to the membrane and therein acts as an ionophore causing the free movement of protons within or across the membrane. It is suggested that this channel forming ability could be an important functional property of MG for proton translocation in chloroplast membranes.

RUCKER, RICHARD A. Memphis State University--Density and home range of the bobcat, *Felis rufus*, in Arkansas. Density and home range of the bobcat, *Felis rufus*, were studied on a portion of the Muddy Creek Wildlife Management Area, Ouachita National Forest, Arkansas. Estimates of density were determined using live trapping techniques. Home ranges were studied using radio-telemetry. Six animals (4 adults, 2 juveniles) were found to occur on the study area. Density estimates were determined as 1 bobcat per 8.8 km². Home ranges varied between sexes and among age groups.

RYALS, PHILLIP E. and HARRIETT E. SMITH. University of Alabama--The effect of vitamin K₁ on microstome-macroscome transformation in the ciliate, *Tetrahymena vorax*. The polymorphic ciliate, *Tetrahymena vorax*, exists in the microstomal form under normal culture conditions. The microstome is

characterized by a relatively small oral apparatus and by the sequential formation of food vacuoles during feeding. When microstomes are subjected to a series of heat shocks followed by suspension in a low molarity phosphate buffer some of the cells are induced to form macrostomes. Macroscomes are characterized by an enlarged oral apparatus and a single, large, membrane-bound cytopharyngeal pouch. The macroscomes feed on untransformed microstomes. The addition of 10⁻⁴ M vitamin K₁ to the phosphate buffer following the heat shock regime will increase the percentage of macroscomes formed by an average of 29% over control values. Essentially the same results are obtained by the addition of vitamin E at an equivalent concentration. Although vitamin E is a known anti-oxidant, the addition of the anti-oxidants ascorbic acid, glutathione or hydroquinone do not elicit a similar response.

SCHNEIDER, REBECCA L. and REBECCA R. SHARITZ. Savannah River Ecology Laboratory--The influence of water vectors on seed availability in a riverine swamp forest.

In riverine swamps, water acts as a mechanism of seed dispersal in addition to wind, gravity, and animal vectors which act in terrestrial systems. The 3000 ha swamp of the Savannah River Plant in South Carolina is composed of approximately 50% cypress-tupelo forest and 50% mixed hardwood islands. Water transport of seeds between the two contrasting communities is limited to late fall and winter when elevated river levels inundate the hardwood islands. We are using seed collectors to quantify the relative inputs of water versus gravity dispersed seeds to a cypress-tupelo community over the fall and winter months. Prior to river flooding, the soil seed bank was sampled within this community and on a hardwood island directly upstream. Germination and sieving techniques were used to enumerate the species composition of these soils. Preliminary results indicate that there are major differences in the composition of woody seed species between the two sites. Large numbers of *Nyssa aquatica* (L.) (tupelo) seeds are present in the deeper swamp soils but overall viability is low. Observations of sediment level changes in the cypress-tupelo forest indicate that the swamp seed bank may be more dynamic than comparable terrestrial systems.

Schwartz, Frank J. and Diane S. Carter. University of North Carolina, Institute of Marine Sciences--Pipefish, *Syngnathus louisianae*, rejected as food by loggerhead turtles, *Caretta caretta*. Syngnathids, pipefishes and seahorses, are rarely encountered as foods of fishes, birds or turtles. Eight species of pipefish have been eaten by *Euthynnus alletteratus*, *Histrio histrio*, *Thunnus atlanticus*, *Gadus morhua*, red snappers, *Echeneis naucrates*, and *Alepi-saurus* (Dawson, 1983). Blue crabs fed on

two additional species, the royal tern one. Dead and live pelagic European snake pipefish, Entelurus aequoreus, have been the only pipefish reported (Pouchet and de Guerne, 1940; Brongersma, 1972) eaten, off the Azores coast, by loggerhead turtles. Wild and captive young or adult loggerhead turtles dislike of pipefish as food led to 245 either/or experiments with chain pipefish, Syngnathus louisianae, versus 12 benthic and pelagic fishes, Anchoa mitchilli, Brevoortia tyrannus, Cynoscion nebulosus, Leiostomus xanthurus, Micropogonias undulatus, Orthopristis chrysoptera, Peprilus triacanthus, Selene vomer, Synodus foetens, Trachinotus falcatus, Trichiurus lepturus, Urophycis regius, and three invertebrates, Loliguncula brevis, Peneus setiferus, Squilla empusa, as food. A six year old 57 cm straight line carapace length, 22 kg, loggerhead, typical of others held in outdoor 9.1x18.2x0.9 m deep tanks ate pipefish on only seven test occasions. Tests were conducted to rule out color, size and shape preference of choice food eaten. No rank odor was evident for test pipefish which harbored dense bacterial populations of Chromobacterium violaceum and Flavobacterium meningosepticum. Perhaps an unknown skin toxin causes pipefish rejection as food by fishes and sea turtles.

SCHWARTZ, FRANK J. and NAT B. FRAZER.

Institute of Marine Sciences, University of North Carolina, and Woods Hole Oceanographic Institution--Growth in weight for loggerhead turtles, Caretta caretta, reared in captivity for 14 years in North Carolina.

Growth curves are not available for individuals from natural populations of loggerhead turtles, Caretta caretta. Data on growth in weight for a male and female loggerhead, born and reared for 14 years under conditions approximating those found in the wild, were fit to logistic and von Bertalanffy equations. Turtles were hatched from eggs collected at Emerald Isle, North Carolina in 1968 and incubated in styrofoam coolers at 28°C. Weights were taken semi-annually when the turtles were moved between large outdoor concrete and smaller indoor tanks. Unfiltered saltwater was pumped through the tanks continuously. Indoor transfer was necessary to prevent stress or death from winter waters cooler than 10°C. Diet of the captive turtles consisted primarily of fishes and other local marine organisms. Feeding was to satiation during June to mid-August; during fall and spring feeding was every two or three days and every third day as their activity decreased during the winter. The non-linear logistic equations,

$$\text{male } w = 93.1 / (1 + 1796.8e^{-0.735t}) \text{ and}$$

$$\text{female } w = 77.5 / (1 + 18684.4e^{-0.960t})$$

provided best fit of the weight data (w = weight, e = base of the natural logarithms, t = age in years). The von Bertalanffy equations projected unrealistic higher asymptotic weight estimates. Our data supports Uchida's (1967) assertions that growth of captive loggerheads fits a logistic equation, but sizes he reported for his 4.5 year old turtles were influenced by a constant 25°C rearing temperature and daily feeding to satiation.

SHAFPER, GARY P. and PETER CAHOON. Louisiana State University and the University of British Columbia--The factors controlling benthic microfloral primary production in wetland ecosystems on the west and gulf coasts of the U.S.A.

Large changes in benthic microfloral production occurred during a one month study (September, 1981), where about 1000 intact sediment cores were incubated in Mugu Lagoon, California. The relative importance of the parameters measured (chlorophyll a , light, water temperature, tidal range, hours of subaerial exposure, benthic community respiration, the physiological state of the microflora, and initial dissolved oxygen) changed during the study. Consequently, time series analysis was much more informative than multiple regression analysis. For a subtidal area with coarse grained sediments tidal range was the most important determinant directly controlling standing crop and indirectly controlling production. For an intertidal fine grained area, subaerial exposure and the physiological state of the microflora were the most important factors. During August 1983, over 3000 cores were incubated in Barataria Bay, Louisiana. Physical disturbance caused by meteorological and lunar tidal events was the dominant parameter controlling production in coarse grained sediments while a combination of physical and biological disturbance was most important in fine grained areas. In both studies, fluctuations in production within a single month approximated those measured by other investigators over an entire year.

SHANN, JODI and UDO BLUM. North Carolina State University--Depletion of ferulic acid, an allelopathic compound, by roots of cucumber seedlings.

Studies indicated an irreversible absorption or adsorption of ferulic acid by cucumber roots. Rates calculated from solution depletion experiments were 1.5, 4.5 and 7.6 $\text{mg g}^{-1} \text{h}^{-1}$ from solutions of 0.5, 0.5 or 1.0 mM ferulic acid, respectively. Depletion of ferulic acid by roots were lower in non-aerated solutions. When plants were provided daily with new solutions containing ferulic acid (serial experiments), the rates of depletion not only continued, but increased with time. For these experiments, part of the depletion may have been due to microbial activity. To determine how important microbial activity may have been in these experiments filter sterilized root exudates containing ferulic acid were inoculated with microorganisms from cucumber roots. Depletion of ferulic acid was monitored for inoculated and uninoculated exudates. Over 4 to 5 hr of the study the depletion from inoculated solutions was not significant.

SHARITZ, REBECCA R.¹ and JOHN R. JENSEN². Savannah River Ecology Laboratory¹ and University of South Carolina²—Use of remote sensing data to map southeastern swamp vegetation.

Dominant vegetation types in a 3000 ha thermally impacted riverine swamp forest in South Carolina were mapped using remote sensing. Data were collected with a multispectral scanner system of high spectral and spatial resolution. Spectral data were calibrated against areas of known species composition; digital image processing techniques were then used to delimit the vegetation units. Natural swamp and bottomland hardwood communities were readily classified; whereas, herbaceous associations in the highly disturbed areas were less easily distinguished. Community classifications were verified by ordination analysis of 150 vegetation quadrats. Accuracy of the remote sensing analysis was assessed by comparing portions of the vegetation maps with ground-truth data collected along transects. Overall accuracy was 83.5%. There was close agreement between the remote sensing and vegetation analysis techniques in identification of dominant community types.

SHERILL, PHILIP A. Middle Tennessee State University—A survey of the benthic macroinvertebrates of Woods Reservoir, Tennessee.

Benthic macroinvertebrates were collected from Woods Reservoir in Franklin County, Tennessee, from March 1982 through March 1983. Ekman dredge samples were taken bi-monthly at three transects chosen to represent the embayment, major inflow, and mainstream. Physicochemical factors were investigated to determine their effect on benthic communities. Diversity and equitability values were determined for each transect to observe community structure. A total of 8,123 individuals representing 28 lowest identified taxa were collected. The number of taxa increased from the embayment to the major inflow. Number of taxa (26), mean abundance, and total number of individuals collected were highest at the major inflow. Chironomids, *Chaoborus* sp., and oligochaetes accounted for 92.85% of the benthos. *Chaoborus* was the dominant taxon and was most abundant in July. Eleven chironomid genera accounted for about one-third of all benthos and were most abundant in January. Oligochaetes were most abundant in May and accounted for about one-fifth of all benthos. Diversity and equitability values increased from the embayment to the major inflow and were highest in the winter months. The combined effect of temperature and oxygen stratification, depth, and type of substrate appeared to have the greatest influence on benthic organisms.

SHOOP, WESLEY L. and KENNETH C. CORKUM. L.S.U.—Pathway of mesocercariae of *Alaria marcianae* through the mammary glands of lactating mice.

Female mammals infected with mesocercarial stages of *Alaria marcianae* are now known to

transmit the infection to their offspring while nursing them. Lactating mice were infected with mesocercariae to demonstrate more precisely how these parasites migrate within the mammary glands. Infected dams were necropsied, the glands removed, and then sectioned serially. Mesocercariae were found to have penetrated the dense connective tissue surrounding the lobules. Within the stroma the larvae migrated along tracks of fat cells and were consistently found in pools of milk created from the destruction of alveoli. These pools of milk led directly into the large lactiferous ducts. It was notable that no mesocercaria was found in the lactiferous or galactiferous ducts indicating that clearance from these vessels is rapid. No larva was found in any blood vessel nor was any significant hemorrhage demonstrable. Lack of an inflammatory response surrounding the larvae was characteristic although large numbers of neutrophils were scattered diffusely throughout the lobules and multiple, proliferative lymph nodules were present.

SHOTOLA, STEVEN J., PHILIP A. ROBERTSON, and GEORGE T. WEAVER. Southern Illinois University—Structural and compositional changes from 1956-1983 in an old-growth Oak-Hickory forest in southwestern Illinois.

A total woody vegetation inventory of stems ≥ 29 cm was performed in 1956 on a 7.2 ha old growth oak-hickory forest in Union County Illinois. Subsequent studies in 1967 and 1983 inventoried all woody vegetation greater than 6.6 cm dbh, along with understory regeneration and herbaceous vegetation. The stand is presently dominated by *Acer saccharum*, *Carya ovata*, *Quercus velutina*, *Q. rubra* and *Q. alba*, in order of decreasing basal area. Basal area has increased in the stand from 20.1 m²/ha in 1957, to a present value of 24.5 m²/ha. Density has increased from 113 stems/ha in 1957, to 134 stems/ha in 1967, then decreased to 112 stems/ha in 1983. *Quercus velutina* and *Q. rubra* are represented by large individuals, and are decreasing in density. *Acer saccharum* is represented by numerous individuals in the understory and overstory. *Acer saccharum* increased in basal area from 0.8 m²/ha in 1957 to 3.5 m²/ha in 1983. *Quercus alba* and *Carya ovata* are maintaining density levels, while increasing in basal area. A reduction in seedling and herbaceous density may be due to a large increase of *Asimina triloba* in the understory. The increase of *Acer saccharum* may indicate a more mesophytic composition in the future.

SIBLEY, STEVEN C. Mississippi State University—Effect of habitat structure on nest height in the Least Flycatcher.

A characteristic range of heights for nest placement has been calculated for most

passerine birds. This height specificity is hypothesized to be an artifact of the spatial arrangement of vegetation species, densities, and structures. A comparison of nest-site data for Least Flycatchers (*Empidonax minimus*) breeding on the grounds of the University of Michigan Biological Station in 1942, 1944, 1946, and 1981 provides strong evidence to support that hypothesis. Of forty-five nests located in the 1940's, 60% were in White Birch (*Betula papyrifera*), and all were less than 11m above the ground ($\bar{x}=5.6m$). Of nineteen nests located in 1981, 63% were in White Birch, and ten were higher than 11m ($\bar{x}=10.4m$). This represents a rise in mean nest heights of 4.8m between 1946 and 1981. During this same period average canopy height in the study area rose 5m, from 11.5m to more than 16.5m. These observations support the hypothesis that nest height is an artifact of specific vegetational components. Comparison of Least Flycatcher nesting data from several other locations show this species to select lower canopy nest sites regardless of tree species or foliage density.

SMITH, ARLO I. Southwestern At Memphis. -- The scarlet woodbine, *Schisandra coccinea* Michaux in Tennessee. -- This species is a woody vine called carolina magnolia vine, wild sarsaparillo, bay star-vine, and scarlet woodbine, originally placed in the magnolia family. It was removed from that family to its own Schisandraceae with the genus Kadsura. *S. coccinea* is the only American species, existing only in the southeastern U.S. Other species are Malaysian or Asian. The family largely has primitive features resembling the magnolia-buttercup complex. The deciduous vine without tendrils has alternate entire, elliptic-ovate, glossy leaves 10-15 cm long. Separate male and female flowers 1 cm across are axillary on single filamentous pedicels on the same plant. There are 3-6 outer yellowish perianth parts and 3-6 inner, ruby-scarlet parts. Filaments of the 5 stamens are united into a pentagonal, low pad in which anthers are nearly embedded. Minute separate pistils (25-30) are closely arranged on a conical receptacle about 5 mm high. The receptacle elongates more than or equal the pedicel, distributing 25-30 scarlet globose berries, 6-10 mm long along the thickened stalk. The plant grows rampant over mostly riverbottom hardwood vegetation, apparently favoring north-facing shaded slopes. It is reported only in Lauderdale, Tipton, and Shelby counties in Tennessee, near the Mississippi River in Arkansas and Mississippi and around the gulf to North Carolina, perhaps with Georgia reporting more locations than elsewhere.

SMITH, WINTFRED L. University of Tennessee at Martin--Reelfoot Lake: its history, development, and management. Reelfoot Lake lies on the floodplain of the Mississippi River in Lake and Obion Counties of Tennessee. According to most historical

accounts, the lake was formed by the New Madrid earthquakes of 1811-1812, although the major basins of the lake appear to be drowned meanders of the Mississippi. Settlement within the watershed and the development of agriculture began about 1820. Since then the lake has been separated from the river, drainage into and out of the lake basin has been modified, erosion in the watershed has been accelerated, and nutrients, pesticides, and heavy metals have been added. The lake now has an open-water area of approximately 52 km², at spillway crest, an average depth of 1.5m, and its volume is being diminished by approximately 1.47×10^5 m³ per year. It is eutrophic and contains nuisance growths of several vascular plants. A management plan for the lake, involving eight state and federal agencies, is now being developed. Major activities included in the plan are the construction of silt detention reservoirs, introduction of *Ctenopharyngodon idella*, cutting of weeds, and dredging of boat canals, and the possible introduction of water from the Mississippi River.

SNELLGROVE, RICHARD L., KENNETH B. DAVIS, and BILL A. SIMCO. Memphis State University--Sex reversal in channel catfish, *Ictalurus punctatus*.

Monosex fish populations may be produced by oral administration of sex steroids during gonadal sex differentiation. Usually, masculinization or feminization of teleosts results from treatment by androgens and estrogens, respectively. However, in channel catfish, feminization can be produced by the administration of either estrogens or androgens. The feminization by androgens is thought to occur by the conversion of the androgen to an estrogen by an aromatase enzyme. The blocking of the action of the enzyme should be possible by the use of sterically different androgens or by the addition of an aromatase inhibitor. Channel catfish treated separately with 11-Ketotestosterone, dihydrotestosterone and 17-alpha-ethyhtestosterone exhibited varying degrees of masculinization, while those treated with northindrone, an aromatase inhibitor in humans, showed distinct sex reversal.

SPEED, JON C. Appalachian State University--A parasitological study of four villages in Western Jamaica.

Between June 1 and July 18, 1983, 1034 blood samples and 704 fecal samples were collected from 1034 individuals in four villages in Western Jamaica. The four villages represent a wide range of social and environmental conditions. Samples were obtained from a broad cross section of the population in each village. Age groups ranged from under 1 year to basic school children 3-5 years, and primary school children 5-15 years. Samples were obtained from 100 pregnant women and older members of the community. Health history data was

recorded for each individual to allow close monitoring of sociological health factors. Blood samples obtained from finger pricks were prepared and stained in the field with standard Giemsa. Packed cell volumes were done from capillary tubes spun down in a centrifuge and compared to a standard set of values. Hemoglobin levels were determined by spectral analysis. This data integrated with the PCV results provided an anemic level value.

Fecal samples were preserved in standard PVA solution. Separate Harada-Mori filter paper strips were made to detect for Strongyloides infection. The standard formal ether concentration techniques were used on all PVA preserved material. Iodine and Wheatley's trichrome stains were used to prepare slides for identification. Preliminary combined results from two of the villages indicate the following rates of infection for the total population: Trichuris trichiura 45%; Giardia lamblia 18%; Ascaris lumbricoides 2.7%; and Hookworm 2.7%. No blood parasites have been observed.

Stalter, Richard. St. John's University--The impact of defoliation by gypsy moths on the forest at Greenbrook Sanctuary, New Jersey.

The present study was conducted to determine the impact of Gypsy moth defoliation on the forest mortality on four species of oaks in the Greenbrook Sanctuary, New Jersey during September and October, 1982. Mortality of Quercus rubra is significantly higher than that of Q. alba, Q. prinus, and Q. velutina. Larger older red oaks experience the highest mortality. Mortality is highest for red oaks occupying moist and mesic sites and lowest for red oaks at the driest site. Red oak has experienced a 56% decline in relative dominance over a three year period, 1980 to 1982.

STOUT, BEN M. III. Tennessee Technological University--Leaf-litter processing in lotic and lentic waters of southeastern Tennessee.

The leaf-litter bag method was employed as one of several techniques for investigating the impact of highway construction on the biota of a wetlands near Soddy-Daisy, Tennessee. Fifteen sites were selected to cover a spectrum of aquatic habitats from lotic erosional to a ten acre "borrow pit." Chemical and physical data, including substrate texture and organics, were used to describe the sites. The benthos in leaf packs were analyzed from a functional group perspective in relation to percent weight of white oak (Quercus alba L.) leaf material remaining in 0.12, 1.59, 4.76, and 9.53 mm mesh bags. Leaf-processing rates were greatest in Falling Water Creek riffle where large particle shredders Amphinemura delosa

and Tipula sp. were common. Processing rates were considerably slower in the absence of shredders. Poor water quality conditions affected the efficiency of leaf-processing communities in North Chickamauga Creek. Removal of streamside vegetation was cited as the major long-term factor inhibiting leaf processing with respect to highway construction.

STRINGFELLOW, FRANK and FETTERER, RAYMOND H., Animal Parasitology Institute, Beltsville, MD--In vitro cultivation of parasitic nematodes and drug resistance.

In vitro culture methods were used to study development of anthelmintic resistance by the sheep stomach worm, Haemonchus contortus. Exsheathed infective larvae of a drug-susceptible strain (BPL) were exposed to 0.1 µg levamisole (LVS)/ml of culture medium, and those larvae which developed to the fourth molt were inoculated orally into sheep. The larval offspring of this infection (SLR₁) were then compared with BPL larvae in vitro by challenge exposure to 1 or 10 µg LVS/ml. SLR₁ larvae developed to early-mid fourth larval stages in 1 µg LVS/ml then died. BPL larvae developed to third molt but rarely ecdysed. Further selection of SLR₁ with higher concentrations of LVS (SLR₂:10 µg/ml; SLR₃:0.3 µg/ml) did not increase the resistance of the parasite to the drug as measured by further growth and development of the parasite during in vitro challenge. These results indicate how in vitro culture methods can be used to develop drug resistant strains of nematodes for study-

STUART, MICHAEL D. North Carolina State University--A preliminary report on the helminth parasites of the eastern box turtle, Terrapene c. carolina, in North Carolina.

Eight species of helminths (Telorchis robustus, Brachycoelium salamandrae, Oswaldocruzia sp., Cosmocercoides dukae, Cruzia testudines, Spirogonia affinis, Physaloptera sp., and Camallanus microcephalus) were recovered during a survey of parasites in 75 box turtles collected in North Carolina. An unidentified species of larval oxyurid nematode was found in deep ulcerations of the stomach walls. Seasonal incidence, levels of infection by sex and age class, and possible life cycles of certain species are being investigated.

SUNDBERG, WALTER J. Southern Illinois University at Carbondale--Lepiota helveola Bres. sensu lato--a toxic mushroom new to Illinois and Kentucky.

Collections of the mushroom Lepiota helveola Bres. sensu lato (subsection

Helveolae Bon & Boiffard) were recently made in Jackson Co., Illinois and Lyon Co., Kentucky and represent the first records of this toxic fungus in the south-central midwest. Lepiota helveola is characterized by its small size, a tomentose and pale cinnamon to pinkish cinnamon cuticle which is diffracted-scaly toward the margin, an irregular, appressed-floccose annulus covered in part with a cuticular layer similar to that of the pileus, similar appearing, irregular scales scattered on the stipe below the annular zone, a faint sweet odor, dextrinoid and short-ellipsoid spores, elongate pilocystidia, and clavate cheilocystidia. This species (and others in subsection Helveolae) reportedly contains potentially lethal amatoxins, and one was recently the cause of a mushroom poisoning death in New York state. Previously recorded only from the east and west coasts, L. helveola sensu lato is apparently more wide spread than previously believed and indicates that care should be taken if searching for wild mushrooms as food.

SYMBULA, MILLIE and FRANK P. DAY, JR.
Old Dominion University--Comparison of root production methods in swamp soils.

The belowground biomass of a maple-gum plant community in the Great Dismal Swamp, Virginia was studied by two different methods. The first involved removal of soil cores with a hand auger to a depth of 40 cm. The second employed a modified implanted soil mass technique. Nylon mesh bags, 7 cm in diameter and 40 cm in length, were filled with peat and buried. During the first month in the field, growth into the top 10 cm of the implants averaged 70 g/m². Biomass estimates decreased in the soil core samples during the summer. The mean value of live root material for 0-10 cm was 438 g/m² in May and 249 g/m² in July. In addition, the dead root matter for the July sample was 162 g/m² which constituted 39% of total root material at that depth. Decreases were also noted in the implant bags. The severe drought conditions experienced during the summer months of 1983 probably account for a portion of the decline in root mass. The appropriateness of the two techniques will be discussed

Tabatabai, Farrokh R. and Michael L. Kennedy. Memphis State University--Movements of raccoons, Procyon lotor, in western Tennessee.

Movement patterns of 15 raccoons, Procyon lotor, were studied in western Tennessee during 1980-1982. Using radiotelemetry techniques, a total of 2005 radio fixes were used to determine home range sizes. The average male home range size was

248.6 ha (n=8) and ranged from 91.8 ha to 416.7 ha. The average female home range size was 147.6 ha and varied from 46.8 ha to 381.5 ha. Home ranges were examined in relation to seasons. Possible explanations are presented for variation in home range size between sexes.

Taller, Barbara J.,¹ Norimoto Murai,² and Folke Skoog.² Memphis State University¹ and University of Wisconsin-Madison²--Cytokinins in the Ribosomal RNA of Higher Plants.

Purified rRNA and tRNA preparations from wheat germ (Triticum aestivum L.) and green pea epicotyls (Pisum sativum L., var. Alaska) were analyzed for cytokinins by enzymatic hydrolysis, ethyl acetate extraction and Sephadex LH-20 chromatography. Cytokinins were tentatively identified by cochromatography with synthetic cytokinin standards in several systems and by activity in the tobacco bioassay. Wheat germ rRNA showed cytokinin activity in fractions corresponding to zeatin riboside (io⁶A) and methylthiozeatin riboside (ms²io⁶A). The tRNA contained isopentenyladenosine (i⁶A) in addition. Both the rRNA and tRNA from 10 day old pea epicotyls contained io⁶A, i⁶A and ms²io⁶A. Ms²io⁶A was the most active fraction in the rRNA, but was the least active in the tRNA, where i⁶A activity predominated. The specific cytokinin activity (activity/A₂₆₀ unit) of the tRNA preparations was over 40 times that of the corresponding rRNAs. Contamination of the rRNA preparations by tRNA could not be excluded, but was shown to be unlikely by the distribution of cytokinin species, gel electrophoresis and analysis of oligonucleotide digests.

TARTER, DONALD C., LEE O. HARTSOCK, STEVE I. MCBRIDE, and MARK F. SHERIDAN.
Marshall University--Low pH tolerance, under continuous-flow bioassay conditions, of hellgrammite larvae, Corydalus cornutus L. (Megalopectera: Corydalidae).

Hellgrammite larvae, Corydalus cornutus L., were experimentally tested under continuous-flow bioassay conditions to determine their tolerance to low pH. The straight-line graphical interpolation method was employed to determine the pH value at which 50 percent of the hellgrammites survived after 96 hours. The TL₅₀⁹⁶ pH value was 1.76. This investigation was compared with other low pH tolerance studies of larval megalopterans.

TARTER, DONALD C. and DANIEL K. PETTRY.
Marshall University--The relationship between body size and body coloration of Baetisca carolina nymphs in Panther Creek, Nicholas County, West Virginia (Ephemeroptera: Baetiscidae).

Considerable inconsistency was noted in the regularity of the coloration exhibited by

Baetisca carolina nymphs during monthly collections from Panther Creek, Nicholas County, West Virginia from October 1981 to September 1982. During fall and winter months, the majority of the nymphs exhibited a dark body coloration, with dark pigmentation on the legs and on the ventral surface of the head, thorax and abdomen. In spring and summer, as the nymphs grew and approached the emergence period, the dark pigmentation diminished among most of the nymphs. A total of 775 nymphs were placed into 0.1 mm size intervals based on head width, and the percent of individuals with light coloration in each size interval was determined. The correlation coefficient between the midpoint of each size class and the percent frequency of light-colored individuals in that size interval was determined to be 0.87. The nymphs were closely examined for the presence or absence of a dark basal band on the caudal filaments. A total of 146 immature nymphs (≤ 1.0 mm head width) were examined and 100 percent of these nymphs exhibited the basal band. A total of 196 mature nymphs with developed wing pads were examined and only 11.2 percent of these nymphs exhibited the basal band. A total of 740 shed nymphal exuviae were examined and only 20.8 percent of these exuviae exhibited the basal band.

THOMPSON, B.A.¹, W.W. Forman² and L.A. Deegan¹ Louisiana State University¹ and Freeport Sulphur Co.²--Fishes of Louisiana's Mississippi River deltaic plain estuaries.

Information on the fish communities from seven estuarine regions of the deltaic plain in coastal Louisiana was compiled from current research with additional data summarized from literature. At present we have inland records for 237 fish species from our target areas: Lake Pontchartrain (129), Lake Borgne (105), Mississippi delta (92), Barataria Bay (186), Terrebonne-Timbalier Bay (147), Fourleague Bay (85), and Atchafalaya Bay (77). These species have been categorized by their ecological affinities, habitat, food groups, and abundance status and the faunal similarities (Long's Formula) of each estuarine system compared. The fish communities of these "estuarine groups" are primarily influenced by the access to the Gulf of Mexico and degree of fresh water influence from the Mississippi River, with the systems closer to the Gulf and with warmer waters and higher salinity regimes being more speciose. The communities are dominated by a few abundant estuarine/marine species such as bay anchovy and croaker, with lesser contributions by freshwater (minnows and sunfish) and estuarine (killifish and gobies) species and finally many occasional and rare marine species. Habitat and abundance information was found to be reasonably complete, but feeding information for many species was spotty or completely absent. New ecological and distributional records for Louisiana are noted for about 25 species.

THORNE, ROBERT M. University of Mississippi--Human occupation of the Mississippi alluvial valley and its impact on the biotic community.

Human occupation of the Mississippi River alluvial valley has a relatively short documented history. Archaeological evidence for the first settlement dates to about 2000 B.C. From at least that point until approximately 1000 A.D., the alluvial valley was inhabited by people whose prime subsistence base was founded on primary forest efficiency. Around 1000 A.D. horticulture was introduced to the valley and hunting-gathering activities were supplemented with domestic crops of corn, beans and squash as well as indigenous grasses. European intrusion into the valley began with the passage of De Soto's expedition in 1542 but intensive European settlement and subsequent alteration of the valley did not begin until almost 300 years later. The speculative towns of Manchester (Yazoo City), Greenwood, and Greenville were developed in 1830, 1834 and 1829 respectively. Land surveys were initiated during this period and were largely completed in the mid-1800's. Land clearing and farming was begun in the vicinity of these communities. Deforestation resulting from farming and lumbering operations progressed rapidly after the Civil War and has led to major changes in land surface confirmation. Channelization, land plaining and other activities have altered the lake and riverine environment of the valley.

TIMMONS, TOM J. and W. E. GARRETT. Murray State University--Effectiveness of residual stumps as fish attractors in Aliceville Lake, Alabama-Mississippi.

Evaluation of fish attractors was difficult during the first two years after impoundment of Aliceville Lake, a 3400 hectare navigational reservoir on the Tennessee-Tombigbee Waterway. Twenty-four areas between 0.4 and 1.0 hectares in size were created as fish attractors by hand cutting trees to a height of one meter. Other areas of standing timber were also left as attractors. Few anglers fished over attractors, preferring instead traditional fishing areas such as standing timber, shore lines, or under-water drop-off areas. The catch per unit of gill net effort by number and weight of sport fishes did not differ between attractors and non-attractor areas ($P \leq 0.05$). There were also no differences ($P \leq 0.05$) for sport fish numbers or weight between areas when fish were poisoned with rotenone after the areas were surrounded with block-off nets. Fish attractors were evaluated by experimental fishing two years after impoundment. Anglers spent 93 hours fishing and the catch of sport fish (largemouth bass, bluegill, and white crappie) per hour was 0.50 at control

areas, 1.10 at attractors, and 1.43 at standing timber. The catch of sport fishes was significantly higher at attractors and standing timber than at control areas ($P < 0.05$).

TOMAN, FRANK¹, J.E. LEGGETT², and J.L. SIMS¹. Western Kentucky University¹, and University of Kentucky²--The effects of manganese toxicity on CO₂ exchange rates and ribulose 1,5 bisphosphate carboxylase activity in burley tobacco.

Nicotiana tabacum L. cv. 'Ky-14' was grown in solution culture under high manganese (80mg/l) levels. The upper lamina where toxicity symptoms appear first, were analyzed for CO₂ exchange rates and ribulose 1,5 bisphosphate carboxylase (RuBPCase) activity 1, 2, and 3 days after Mn treatment was initiated. Carbon dioxide exchange rates and RuBPCase activity of Mn treated plants were reduced in the lamina of leaf #1 and #2. Total carbon showed similar reductions. This indicated that as Mn was accumulated to toxic levels, RuBPCase activity was reduced, causing in part, reduced CO₂ exchange rates and total carbon accumulation in the Mn treated plants.

TOMSKO-TWIGG, CYNTHIA J. and JAMES H. HOWARD. Frostburg State College--An in vivo screening procedure to detect point mutations in vertebrate tissue.

A preliminary investigation of an in vivo screening method to detect point mutations in vertebrate tissue is presented. A small sample of tail tissue was removed from individual salamanders (*Desmognathus* sp.) and regeneration occurred in the presence of suspected mutagens. Starch gel electrophoresis and histochemical staining were used to visualize enzyme loci from tissue samples taken before and after treatment with the mutagen. Previous studies indicated a large number of loci need to be screened in order to demonstrate mutations at enzyme loci. By using a different dosing procedure, we hoped to reduce the number of loci necessary. Mutagens were externally applied to the salamanders in an aqueous solution. Acute groups received 24 hours of exposure while chronic groups were treated for 6 weeks. Salamanders were treated with hydroxylamine, a point mutagen and N-methyl-N-nitro-N-nitrosoguanidine, an alkylating agent. Of 414 loci screened to date, one presumptive mutation was detected at LDH-1 in a salamander which received a chronic dose of 10⁻⁴ M hydroxylamine. This represents an increase over frequencies previously reported.

TOOLE, JOSEPH E. and KENNETH C. CORKUM. Louisiana State University--A TEM comparison of the tegument of *Spirometra mansonoides* (Cestoda: Pseudophyllidae) from endo- and ecto-thermic hosts.
Spirometra mansonoides is a pseudophyllidean tapeworm whose life cycle

involves several endo- and ecto-thermic hosts. Since the tegument is a structure of considerable importance to the tapeworm metabolically, it follows that it may be sensitive to effects that different physiological systems (endo- and ecto-thermic) may exert on it. Although the tegumental profile has been partially documented, this study will report comparative aspects of tegumental morphology from worms reared in several different hosts. Considered are apparent differences in microtriche density and types, distal cytoplasm vesicle types, and subtegumental cell activity.

TRAUTH, STANLEY E. and WAYNE R. FAGERBERG. Southern Methodist University--Morphometric analysis of eggshell structure in the lizard *Cnemidophorus sexlineatus*.

Three distinct zones of the eggshell of the lizard *Cnemidophorus sexlineatus* were recognized using SEM and TEM. Stereological parameters were used to describe the relationships between eggshell fibrils and interfibrillar space as well as space found within fibrils. The first zone (Z1), which occupied 13% of eggshell volume, contained fibrils significantly more dense than fibrils in the other zones. The ratio of interfibrillar space to fibrillar volume was equal in Z1. The fibrils in Z1 were equal in diameter to those in Z2. Zone 2 fibrils are less dense than those in Z1 (less interfibrillar space). Zone 2 occupied 61% of the total eggshell volume. There was significantly more fibrillar volume relative to space volume in this zone. Fibrils in Z3 were significantly smaller than those in Z1 or Z2 but did not change in fibrillar density. Zone 3 occupied 26% of the total eggshell volume. Based on actual volume measurements the Z1 fibrils were 1.3 times more dense than Z2 fibrils and 4.5 times more dense than Z3 fibrils. The Z2 fibrils contributed 5 times as much fibril to the total eggshell as Z1 and 3 times the fibril contributed by Z3. There was a significant decrease in the proportional volume of the fibril-interfibrillar space in Z3 compared to Z2. Whether the major controlling factors in eggshell formation are exerting their influence intrinsically or extrinsically on the oviductal glands that form eggshells is not clear, but our data strongly support some type of controlling mechanism.

UDVIG, TODD AND G. T. WEAVER. Southern Illinois University--Effects of pine conversion on acid sensitive soils.

The capacity of pine foliage to buffer acids in atmospheric deposition is lower than for oaks. This suggests that conversion of natural oak stands to pine could accelerate acidification of soils sensitive to acidic deposition. To test for possible effects of pine conversion, the attributes of two sensitive, central Wisconsin soil series with natural oak and 40 year-old pine plantations were

determined. Vegetation was described and soils sampled at five randomly selected locations in three oak and three pine stands per series. Differences in pH were slight between oak and pine stands occupying the same series. Greater removal of soil Ca by oaks may have occurred and contributed to the degree of acidification observed. Differences of 1-1 1/2 pH units occurred between series and may be related to the quantities of weatherable minerals present.

UPTON, STEVE J.,¹ T. BARRY HAYNES,¹
WILLIAM L. CURRENT,¹ and SUSAN M.
BARNARD,² Auburn University and Atlanta
Zoological Park - - Development of
Caryospora simplex in human embryonic
lung cell culture.

Leighton tubes containing monolayers of human embryonic lung cells were inoculated with 70,000 or 30,000 sporozoites of the viperid coccidium, *Caryospora simplex* and examined at 1,2,4,6,8,10,12,14,16, and 18 days post-inoculation (PI). Sporozoites penetrated host cells and developed into Type I meronts, which were mature on days 6-16 PI and contained 8-22 short, stout merozoites. Mature Type II meronts were present 10-18 days PI and contained 8-22 long, slender merozoites. Developing gamonts were seen on days 14-16 PI and mature micro- and macrogametes and thin-walled, unsporulated oocysts were present on days 16-18 PI. Attempts to sporulate oocysts in tissue culture medium or in 2.5% K₂Cr₂O₇ at 25 C or 37 C were unsuccessful.

VAN DEN BUSSCHE, RONALD A. Memphis
State University--Helminth
parasites of the coyote, Canis
latrans, in western Tennessee.

A total of 141 coyotes, *Canis latrans*, were collected from 17 counties in western Tennessee from 1981 to 1983. Hearts and digestive tracts were examined for helminth parasites. Six species were found which included one cestode and five nematodes. Species determined and percent occurrence were: *Dirofilaria immitis* (41.8%), *Physaloptera rara* (43.3%), *Taenia pisiformis* (65.2%), *Trichuris vulpis* (54.2%), *Ancylostoma caninum* (57.4%), and *Toxascaris leonina* (9.2%).

VARNEY, D.R.,¹ M.R. SIEGEL,² M.C. JOHNSON,² W.C. NESMITH,² R.C. BUCKNER,²
L.P. BUSH,² P.B. BURRUS II² AND T.A.
JONES.² Eastern Kentucky University¹ and
University of Kentucky.--Incidence and
dissemination of the endophytic fungus,
Epichloe typhina, in tall fescue, Festuca
arundinacea.

Epichloe typhina (= *Acremonium coenophialum*), the cause of fescue toxicosis in cattle, was

shown to be widely distributed and at high levels of infestation in tall fescue fields in Kentucky. ELISA analysis of plant parts showed the highest concentration of the endophyte in leaf sheaths and seeds, lower amounts in crowns and stems, and very low amounts in leaf blades and roots. Dissemination of the endophyte is dependent upon seed dissemination. Pollen, wind, rain and mechanical mowing are ineffective in disseminating the fungus. Randomized split plots of named cultivars and experimental strains of tall fescue were managed for seed production (SP) and hay pasturage (HP) for 4 years. Endophyte levels remained unchanged on the SP plots. Stem analysis showed lower endophyte levels in the HP management plots when compared to the SP plots. Agronomic performance of tall fescue was shown to be independent of the fescue endophyte.

VIDRINE, MALCOLM F. Jefferson Davis
Parish Mosquito Abatement District No. 1--
Vietsatax, genus or subgenus?

Vietsatax Uchida and Imamura 1938, a monobasic, Asian taxon in the subfamily Unionicolinae Oudemans (Acari: Unionicolidae) has had several changes in status and is presently considered a genus. *Vietsatax parasiticum* Uchida and Imamura is distinguished from other mites by the morphology of the genital region of the males of the species. The females, however, are morphologically and behaviorally similar to three species in the genus *Unionicola* Haldeman (subgenus *Pentatax* Thor): *U. intermedia* (Koenike 1882) in Europe and Asia, *U. wolcotti* (Piersig 1900) and *U. mitchelli* Conroy 1982 in North America. These four species of mites are parasites of freshwater mussels (Unionidae: Anodontinae), in which the female mites commonly reside while the males are usually free-swimming. Eggs and encysted developing stages of the mites are found in the epithelia of the mantle and foot of their hosts. The males of these species share a number of derived characters including leg structure and chaetotaxy. Vicariance and monophyly are suggested among these synapomorphic species, and thus *Vietsatax* is considered more closely related to mites in the subgenus *Pentatax* in the genus *Unionicola*.

VIDRINE, MALCOLM F. and R. E. McLAUGHLIN.
Jefferson Davis Parish Mosquito Abatement
District No. 1, and USDA - ARS Gulf Coast
Mosquito Research Laboratory--Colonial
rotifers in southwestern Louisiana rice
fields.

While searching for mosquitoes in rice fields in the vicinity of Jennings, Louisiana, in the summer of 1983, one or more species of colonial rotifers (Monogononta: Flosculariidae) were encountered in 80 of 100 fields sampled. Most common were two subspecies of *Sintherisma spinosa* (Thorpe). These spherical, white to yellow, ca. 1.0 mm in diameter, free-swimming colonies contained

approximately 50 individual rotifers. The two subspecies had distinctly different mastaxes, and one had numerous spines on its neck. An additional *Sinantherina* sp. was locally abundant. This species comprised ovoid, white to green, 1.0 - 2.0 mm, free-swimming colonies of approximately 100 individual rotifers. Another rotifer, *Ptygura* sp., was sporadically encountered. It occurred as brown, gelatinous colonies that were as large as 3.0 cm and attached to plants or debris. The larger colonies contained more than a thousand rotifers. Smaller colonies (0.5 - 1.0 cm) were spherical and were observed floating just beneath the water's surface. Each rotifer had a fibrous tube, a long foot and a large, emarginate corona. Colonial rotifers were the dominant macroscopic filter feeders in the rice fields in the area studied.

We appreciate the assistance of Dr. Robert W. Pennak, E. P. O. Biology, University of Colorado, Boulder, Colorado, for identification of the rotifers.

VIGH, D. A., and M. FINGERMAN.
Tulane University--Molt staging in the fiddler crab, *Uca pugnator*.

The cuticle and epidermis exhibit many biochemical and morphological changes during a complete molt cycle. Associated biochemical and biophysical changes also occur in the other portions of the crab during the molt cycle. In research on molt influenced events, the phase of the molt cycle in which the animal is should be determined as precisely as possible. The technique of staging by observing setal development is gaining more and more popularity, and is generally considered to be the most accurate one of all. The method has now been adapted to the molt cycle of the fiddler crab. The molt cycle has several distinct stages and substages that are primarily based on setogenic events and epidermal retraction. The major stages being AB (Postmolt), C (Intermolt), D (Premolt), and E (Ecdysis). The substages of D stage are D0, D1, D2-3 and D4. The major stages AB and C also have substages, but these are not based on setal development or epidermal retraction. The setogenesis method of molt staging is applicable to most crustaceans, with tailoring to individual genera and species.

WALKER, ALICE M., LAFAYETTE FREDERICK, and W. LENA AUSTIN. Howard University--Rib formation in ascospores of *Neurospora crassa* - confirmation of the presence of intrasporal membrane plaques.

For homothallic species of *Neurospora* it has been demonstrated that the rib-vein pattern of ascospore walls is determined by a system of endomembranes that appear in the sporoplasm of the young ascospore. These mem-

branes, termed intrasporal membrane plaques (IMP) become appressed against the inner surface of the spore plasmalemma and delineate the position of ribs and intercostal veins of the ascospore wall. Such a system has not previously been shown to be the mechanism responsible for the delineation of the rib-vein pattern of ascospore walls of heterothallic species of *Neurospora*. In this study, wall development of *Neurospora crassa*, a heterothallic species, has been observed by light and transmission electron microscopy and the presence of IMP as the rib-vein delineating mechanism has been confirmed. Cisternal elements, the IMP, become positioned at evenly spaced sites along the inner surface of the young ascospore plasmalemma prior to the appearance of the rib-vein wall layer. Once IMP are in place, deposition of wall material of the rib-vein layer commences. Ribs form only in places on the outer surface of the spore plasmalemma that are free of underlying IMP. This common mechanism for the delineation of ascospore wall surface topography in homothallic and heterothallic species of *Neurospora* provides further evidence in support of the congeneric relationship of these groups of species.

WALKER, GARY L., and EDWARD E. C. CLEBSCH. University of Tennessee--The ecology of northern white cedar, *Thuja occidentalis* L., in its southern disjunct range.

The floristics, ecology, and population biology of white cedar are studied to provide information in determining the natural history and present status of the most southern disjuncts of this species. First described as a possible glacial relict by Braun (1928) and Caplenor (1975), closer examination of populations using predictive field botany in Tennessee, Kentucky, and Virginia has revealed other disjunct species with the same northern population centers in stands of white cedar. Previously unknown stands of white cedars were discovered using these techniques. An ecological investigation is ongoing to determine the present status of these southern stands as is an electrophoretic analysis of proteins for information regarding the population biology of this species.

WARRINGTON, SARAH J., H. DELANO BLACK and LEWIS B. COONS. Memphis State University--Methods of entry of *Pisolithus tinctorius* (Pers.) Coker and Couch hyphae into *Pinus taeda* L. short roots.

Ectomycorrhizal research has dealt mainly with the morphology, anatomy, and physiology of mature associations. Little has been done on the establishment of ectomycorrhizal associations, however. This research examines developing ectomycorrhizae by means of scanning and transmission electron microscopy. *Pinus taeda* L. seedlings were grown in plastic growth pouches. In eight weeks the trees produce branched root systems with short roots. Plugs of *Pisolithus tinctorius* (Pers.) Coker & Couch growing on MMN agar were placed near the root systems. In as little

as four days hyphae begin mantle formation and also the initial penetration of the root. Penetration of hyphae into short roots is as follows: (1) between dead cells at the root surface (2) between living root cap cells (3) between living cells of epidermal or cortical origin at the root surface. It appears that *P. tinctorius* is primarily opportunistic in entering through areas of weakness between cells.

WELCH, KENNETH J. Marshall University--Growth rates of the Asiatic clam, *Corbicula fluminea* (Müller), in the Kanawha River, WV.

A total of 80 small *Corbicula fluminea* individuals were segregated into three shell length classes. Thirty clams were assigned to Class I (<10mm); 25 to Class II (10 to 11.9 mm); and 25 to Class III (12 to 14 mm), and placed in separate cages on the Kanawha River at Marmet, W. Va. for a 12 week period (16 July thru 8 October 1983). Growth rates for length Classes I, II, and III were 0.95 mm/wk, 0.86 mm/wk, and 0.80 mm/wk, respectively.

WERNER WIELAND & JOHN S. RAMSEY. Department of Biological Sciences, Mary Washington College, VA & Alabama Cooperative Fishery Research Unit, Auburn University, AL--Life history of the Muscadine Darter, *Percina* sp. cf. *P. macrocephala*, in the Tallapoosa River, Alabama.

Percina sp. cf. *P. macrocephala* appears to be a miniaturized version of *P. macrocephala*, reaching a maximum length of about 60 mm and a maximum age of 2+ years. Its prime habitat, pools below riffles with some current and sand or gravel substrate, is also characteristic of those of *P. macrocephala*, *P. maculata* and *P. pantherina*, whereas the other members of the subgenus, *P. peltata*, *P. notogramma*, *P. crassa* and *P. roanoka* are more commonly associated with riffles. The relatively small size of the apparently 'pelagic' *Percina* sp. does not agree with the tendency for midwater darters, rather it follows the tendency observed for pool species. Its diet of immature insects, although common among darters, is not as diverse as that reported for other species. Spawning occurs in the spring (April) at temperatures below 20 C, as has been reported for other *Aluoridius*.

WERTH, CHARLES R. College of William and Mary--Genetic variation in *Asplenium platyneuron* (L.) Oakes (Aspleniaceae)

Asplenium platyneuron is a common fern with considerable ecological amplitude. Genetic

variation at 18 loci coding 12 enzyme systems has been analyzed for more than 20 populations of this species, utilizing starch gel electrophoresis. Four loci (GOT-1, G6PDH, PGI-2, PGM-2) were polymorphic for similar allele complements in most populations. Rarer alleles were detected at other loci. Certain geographic trends in gene frequencies were observed. Comparisons of genotype frequencies with Hardy-Weinberg expectations showed marked deficiencies of heterozygotes, indicating high levels of inbreeding. Selfing capacity in *A. platyneuron* may be of importance in facilitating colonization of second growth woods in which it flourishes.

WERTH, CHARLES R.,¹ RIOPEL, JAMES L.,¹ and NAN W. GILLESPIE,² University of Virginia¹ and Princeton University²--Genetic uniformity in an introduced population of witchweed (*Striga asiatica*) in the United States.

Witchweed, *Striga asiatica*, an important parasitic weed through much of the old world, occurs as a recent (30 yr.) introduction in a limited region in North and South Carolina. Reproduction in this population has been shown to occur primarily through self-pollination of flowers. Genetic diversity in two populations from this region was assessed utilizing starch gel electrophoresis and staining of enzymes. An average of 64 individuals were observed to be monomorphic at a probable minimum of 32 genetic loci coding 18 enzyme systems. This lack of polymorphism is attributable to the combined effects of the probable founding of the population by one or a few individuals and the predominantly autogamous breeding system.

WEST, BRENDA K. and DAN K. EVANS. Marshall University--Vegetation of Disturbed Wetlands in the Kanawha River Floodplain, West Virginia.

Eight disturbed wetland sites along the Kanawha River floodplain in West Virginia were analyzed both vegetationally and floristically. All sites had previously been cleared and undergoing secondary succession for periods of 1 to 30 years. Vegetation types were classified according to species composition and physiognomy into 10 cover types with some sites supporting more than a single type. Cover types included aquatic, wet meadow, shrub-wet meadow, *Spiraea tomentosa* and *Cornus amomum* dominated sites in addition to wetlands supporting immature forests. Random plot sampling was used to establish frequency, density, dominance and importance values for both herbaceous and woody vegetation. Flora and community dynamics are compared and contrasted. Community coefficients for 10 cover types ranged from .00 to .54. Soil types are described and classified as wetland or nonwetland soils. Finally,

a model predicting direction of development and succession in disturbed wetlands is presented.

WILLIAMS, JOHN M. Marshall University
--Long term spatial distribution of
major forest species.

Increment cores from trees comprising fourteen major forest species from twenty sites in western Virginia and West Virginia were analyzed for similarities in growth ring patterns. These patterns were correlated with the spatial distribution of each species on every site. In general, conifers and hardwood species display different distribution patterns with a variety of interspecific differences. Classification by site demonstrates an environmental effect on the distribution patterns. Cluster analysis using individual trees as variables of a selected "parent" tree demonstrates growth correlations amongst particular species at each site. The study encompasses a maximum of one hundred and fifty growing seasons.

WILLIG, MICHAEL R. Texas Tech University
and the Center for Energy and Environment
Research of the University of Puerto
Rico--An Experimental analysis of optima
foraging theory in Lamponius portoricensis
from Puerto Rico.

Data were collected on the response of 10 adult male and 10 adult female walking stic (*L. portoricensis*) to changes in the absolute abundance of leaves from 5 different plant species (*Piper hispidum*, *P. treleaseanum*, *Dendropanax arboreus*, *Urera baccifera*, and *Hibiscus rosa-sinensis*) in the Luquillo Experimental forest of Puerto Rico. When the absolute abundance of food doubled (relative abundances of all five foods were equal), the consumers responded in a fashion inconsistent with the predictions of optimal foraging theory. Partial preferences were exhibited at both low and high abundance with the number of statistically distinguishable food groups increasing with increased abundance. Males and females exhibited similar preferences although the highest ranked food consistently differed between them. Appreciable intrasexual variation in food consumption characteristic of both sexes. Although energy content is probably a major determinant of preference, caloric and elemental analyses (P, S, N, Zn, Mn, Ca, Mg, K, Na) of the leaves of each plant species suggest that preference is related to a complex of factors which may include nutrient constraints.

WINSTEAD, JOE E. and FRANK R. TOMAN.
Western Kentucky University--Mineral uptake
and accumulation by differentiated
populations of Andropogon virginicus L.
surviving on abandoned coal strip mines.
Populational adaptation to coal spoils by
broomsedge has shown differential ion uptake

as a possible mechanism of survival. Atomic absorption analysis of plant tissues grown under growth chamber conditions and in reciprocal tests of strip mine and non-stripped mine soils indicates selectivity of metallic ions as Mg and Ca by strip mine populations compared to populations found in old field habitats. Both populations showed similar uptake of Fe, Cu, Zn and Mn. After five years of culture of both strip mine and old field populations on strip mine soils under greenhouse conditions, higher levels of chlorophyll were found being produced in the strip mine ecotypes compared to clonal material of this species originally from non-mined habitats. These data correlate with previously reported studies involving selectivity of Na, K and Li ions and biomass development indicating the role of populational adaptation in the selection of *Andropogon virginicus* as a pioneer species in colonizing the ecosystems resulting from coal mining operations.

YELVERTON, G. FRANK and COURTNEY T. HACKNEY. University of North Carolina
at Wilmington--Export of dissolved
organic carbon (DOC) from the substrate
of a North Carolina salt marsh.

The export of DOC from a sandy substrate, *Spartina alterniflora* marsh was studied from August 1982 through July 1983. DOC was reliably estimated by measures of fluorescence and absorbance of the pore water. DOC ranged between 1 and 6 mg per l and was highest during the summer and lowest in the winter. Pore water movement was estimated by two different methods. Over 26,000 l of water were exported from a 1 m wide transect according to one method and 34,000 using the second method. Most of this water movement (over 80%) occurred within 4 m of the edge of the creek. The transport of carbon as DOC from the marsh substrate accounted for less than 1% of the net primary production of the roots and rhizomes of this community.

ZERFOSS, LEWIS F. Tennessee Wildlife Resources Agency--The Hatchie River: An
Overview of Natural Resource Management
Problems.

The Hatchie River is the last remaining unchannelized stream in West Tennessee. This "swamp river" has extensive floodplains containing some 118,000 acres of wetlands and bottomland hardwood timber. A low gradient stream the river meanders some 190 miles (in Tennessee) across its floodplain before flowing into the Mississippi. Alluvial soils in the floodplain are highly productive giving rise to extensive agricultural exploitation. Channelization of tributary streams, land clearing and soil erosion are the major problems affecting proper natural resource management within the Hatchie system. Historically row-crop farming of West Tennessee floodplains has led to demands for stream channelization. Realizing this natural resource managers in the Hatchie basin are working diligently with local, state and federal agencies and private landowners to focus attention on the river; its problems, values and future.

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ASB Candidates for Office—1984

The Nominating Committee, composed of R. O. Flagg, J. K. Shull, Jr., and Chairman J. F. McCormick, has selected the following slate of nominees for the ASB offices to be filled this year. Additional nominations will be received from the floor. Voting will take place at the Annual Business Meeting Friday morning. Please plan to attend.

President-Elect: —**Lafayette Frederick**, Howard University

—**George S. Ramseur**, University of the South

Vice-President: —**Delores S. Dundee**, University of New Orleans

—**Sharon Patton**, University of Tennessee, Knoxville

Executive Committee: —**Carol C. Baskin**, University of Kentucky

(Two positions) —**Courtney T. Hackney**, University of North Carolina,
Wilmington

—**James H. Horton**, Western Carolina University

—**James L. Riopel**, University of Virginia

PRESIDENT-ELECT



Lafayette Frederick



George Ramseur

Lafayette Frederick—Dr. Frederick received the B.S. (1943) degree from Tuskegee Institute, the M.S. from the University of Rhode Island (1950), and the Ph.D. from Washington State University (1952). He has held positions at Southern University, Baton Rouge, Louisiana (1952–62), Atlanta University, Atlanta, Georgia (1952–76), and Howard University, Washington, D.C. He served as chairman of the Department of Biology during his tenure at Atlanta University and has served as

chairman of the Department of Botany at Howard University from 1976 to the present time. Dr. Frederick has been an NSF Science Faculty Fellow in the Department of Botany at the University of Illinois (1960–61), a visiting research associate in the Department of Microbiology at the University of Georgia (Spring 1975), and is currently on sabbatical leave as a visiting research professor in that department (1983–84). His research interests have involved studies on crown gall tumorigenesis, systematics and spore development in coelomycetous fungi, systematics and distribution of myxomycetes, cell development in ascospores of *Neurospora* and related genera, and the histopathology and physiology of the Dutch elm disease. His current research emphases are on ascospore wall development in the Sordariaceae and the systematics and distribution of corticolous myxomycetes. Dr. Frederick has advised 9 Ph.D. students and 29 M.S. degree students. He has been a member of ASB since 1958 and currently serves as a member of the Executive Committee and its representative to AAAS. He has been a member of the Commission on Undergraduate Education in the Biological Sciences (CUEBS), committee member and chairman of the Biology Achievement Test Development Committee for the Educational Testing Service, committee member and chairman (1975–76) of the General Research Program Advisory Committee of the NIH, Fellow and President of the Georgia Academy of Science, member of the Smithsonian Foreign Currency Program Advisory Council for Systematic and Environmental Biology, and a member of the Southeastern Forestry Research Advisory Committee. Dr. Frederick is a member of 12 national and international professional societies.

George S. Ramseur—Professor and Chairman of the Biology Department at the University of the South, Sewanee, Tennessee. He was educated at Elon College and the University of North Carolina at Chapel Hill, and has been at Sewanee since 1958. Dr. Ramseur was a consultant to the Summer Science Institutes in India program at Punjab University in 1966 and Banaras Hindu University in 1967. He was visiting professor in the Botany Department at UNC–Chapel Hill in 1966–67 and in the summer of 1970. Dr. Ramseur's research interests include patterns of plant succession in the spruce-fir forests of the Southeastern U.S., and the upland vegetation of the southern Cumberland Plateau. A member of ASB since 1958, Dr. Ramseur has served on the Meritorious Teaching Award Committee, the Research Award Committee, and the Executive Committee. He is also a past-president of the Southern Appalachian Botanical Club.

VICE-PRESIDENT

Dee S. Dundee—Professor of Biological Sciences at the University of New Orleans (LSU system) where she has taught since 1958. She holds a Ph.D. from the University of Michigan. Her teaching responsibilities at both undergraduate and graduate levels include courses in Evolution, Zoogeography, Malacology, Parasitology, and Freshman Biology. She is a biologist with research interests and numerous publications in Malacology. Current research is concerned with slugs (and attendant economic problems) in Central America. Dr. Dundee has hosted Association of Southeastern Biologists in New Orleans; has served as President of the American Malacological Union; Editor of the American Malacological Union publications for seven years; and Secretary of the American Microscopical Society. In addition to the usual numerous departmental, university, and system committees one must serve on, she is and has been involved in a variety of other activities: community; a member of a number of visiting committees for Southern Association of Colleges and Schools (re-accrediting agency); and a national aviation advisory committee (advisory to the administrator of Federal Aviation Agency). In her spare time she plays a lot of tennis so that one day she will be able to beat Martina Navratilova.

Sharon Patton—Associate Professor of Parasitology in the Department of Pathobiology at the University of Tennessee College of Veterinary Medicine. She received the B.S. degree in Biology from Middle Tennessee State University, the M.S. degree in Zoology, and the Ph.D. degree in Parasitology from the Thomas Hunt Morgan School of Biological Sciences at the University of Kentucky. Before returning to Tennessee she was a postdoctoral scholar with Dr. J. H. Drudge of the Veterinary Science Department at the University of Kentucky. Dr. Patton's research interests center around worms (specifically veterinary helminthology). She has studied the host-parasite relationship as it involves the immune response, epidemiology, as well as general life cycle of helminths. She is also interested in zoonotic parasitic diseases and is presently involved in research concerning toxoplasmosis in dairy goats. At the University of Tennessee Dr. Patton has served on a variety of committees and university organizations. At present, she is serving a second term on the Faculty Senate and chairs the Institute of Agriculture Advisory Committee. She recently received the Lindsay Young Outstanding Teacher

Award and the University of Tennessee Woman of Achievement citation for the "Tradition of Excellence." Dr. Patton has been a member of ASB since 1973 and is presently on the executive committee. She is a member of several other scientific societies including the Southeastern Society of Parasitologists (president 1981-82), American Society of Parasitologists, American Association of Veterinary Parasitologists, Sigma Xi, Tennessee Academy of Science, Helminthological Society of Washington, American Society of Tropical Medicine and Hygiene, Wildlife Disease Association, and AAA.

EXECUTIVE COMMITTEE

Carol C. Baskin—A native of Boonville, North Carolina, Dr. Baskin was educated at Florida Southern College (B.S., 1964) and Vanderbilt University (Ph.D., 1968). She has been at the University of Kentucky for 16 years, where she is Dr. Jerry Baskin's research partner. Together they have published over 140 papers on various aspects of the ecological life cycles of weedy and nonweedy (including southeastern U.S. cedar glade endemics) plant species. She has been a member of ASB since 1965. She also is a member of the Ecological Society of America (ESA), Torrey Botanical Club, Sociedad Botanica de Mexico, Kentucky Academy of Science, Tennessee Academy of Science, and Botanical Society of America (BSA). She has served as Secretary of ASB (1979-82), a member of the Finance Committee of ESA (1979-81), and presently is serving as Secretary of BSA (1980-84).

Courtney T. Hackney—Dr. Hackney is an Estuarine Ecologist at the University of North Carolina at Wilmington where he has been since 1980. He received his B.S. (1970) from the University of South Alabama at Mobile, and his M.S. (1972) from Emory University in Atlanta in Biology. He earned his Ph.D. (1977) at Mississippi State University in Zoology. He attended his first ASB meeting in 1970 as a Beta Beta Beta member, joined ASB the following year, and has attended all but one of the annual meetings since that time. He was a member of the Editorial Board of the journal *ESTUARIES* from 1978-83 and currently serves a similar position for the journal *WETLANDS*. He was program chairman for the Gulf Estuarine Research Society (1978-80) and for the Society of Wetland Scientists (1981-83). He is currently Editor of the Society of Wetland Scientists' Newsletter. In addition to ASB, Dr. Hackney is a member of the Ecological Society of America, Southeastern Estuarine Research Society, American Society of Limnology and Oceanography, Society of Wetland Scientists, and the Estuarine and Brackish-Water Sciences Association. His research interests include many topics in Estuarine Ecology. His most recent papers have dealt with Energy Flow through Estuarine Ecosystems, the Ecology of the Carolina Marsh Clam, and Plant Communities in Low Salinity Marshes.

James H. Horton—Former Head of Department and currently Professor of Biology at Western Carolina University in Cullowhee, N.C. A native of Salisbury, N.C., he took his A.B.Ed. at the University of North Carolina at Chapel Hill with a major in English. He holds the M.A. and Ph.D. degrees, both in Botany, from U.N.C.-C.H. where he was William Chambers Coker Fellow in Botany. He went to W.C.U. in 1961 after teaching for a year in Botany at Chapel Hill. Dr. Horton's research interests include the taxonomy of southeastern Polygonaceae, especially the genus *Polygonella*, and the descriptive ecology of Blue Ridge and Great Smoky Mountains plants. He is a contributor to the Southeastern Flora Project. Dr. Horton has served as President of the North Carolina Academy of Sciences and on the Editorial Board of the Journal of the Elisha Mitchell Scientific Society. He is currently Chairman of the North Carolina Plant Conservation Board, the body legally empowered to list and protect threatened and endangered plant species in North Carolina. He has been a member of ASB since 1956.

J. L. Riopel—Associate Professor of Biology at the University of Virginia. He received the B.S. in Biology from Bates College and M.S. and Ph.D. from Harvard University. He has been at Virginia since 1960, where in addition to teaching and research, he was Associate Dean of the Graduate School of Arts and Sciences (1968-69) and Co-Director of the Mountain Lake Biological Station (1961-82). A member of ASB since 1961, he has previously served in numerous ASB functions including the Executive Committee and the Meritorious Teaching Award Committee (1982). Dr. Riopel is a developmental botanist. Research interests have been concerned with positional patterns for lateral root initiation and hormonal regulation of xylem differentiation in cell suspension cultures. More recently, he has been involved in studies on regulation of haustorial development in parasitic angiosperms and the chemistry of host/parasite interactions.

Book Reviews

Dring, M. J. 1982. **The Biology of Marine Plants.** Edward Arnold Press, 41 Bedford Square, London WC1B 3DQ. \$18.95. 199 pp. illus., paper.

According to the Preface, the proposed intent of this book is to present, at the undergraduate level, information on a wide range of contemporary topics in biology as they relate specifically to plants in marine environments. This is an all-inclusive treatment, with space given to non-photosynthetic bacteria and fungi as well as photosynthetic unicellular planktonic and macroscopic forms. The book's nine chapters emphasize processes such as photosynthesis, productivity, morphogenesis, and nutrient-organism interactions. Each topic is clearly and concisely presented, and documented with recent references. There are 267 citations. The numerous illustrations are pertinent and clearly reproduced.

This small but informative book, which gives an introduction to recent analytical and experimental studies on marine plants, should provide irresistible reading for even non-phytologists. Both its format and content make it a valuable supplement to any marine biology course and a useful addition to a reference library. (*Donald F. Kapraun, Department of Biological Sciences, UNC-W, Wilmington, NC*)

Castro, J. I. 1982. **The Sharks of North America.** Texas A&M University Press, College Station. \$19.50 cloth, \$9.95 paper. 180 pp. illus.

This 6 × 9" book represents the first attempt to deal with all the sharks that inhabit "North American Waters" north of the 20°N parallel and seaward for 500 miles. Line drawings depict each of the 108 species and 18 major shark families discussed. Brief comments of species description, similar species, range, biology, reproduction, relation to man, fishing, and selected references treat each shark. A key to each shark family and species is included.

While limited by space or in some cases knowledge, we also learn that the largest shark is the whale shark, and *Squaliolus laticaudus* at 6–9 inches the smallest. Likewise, sharks can be varied in color from blue, gray, yellow to white. Bull and smallmouth hammerhead sharks do enter fresh water. Albinism is known for the basking, gray smoothhound, and scalloped hammerhead sharks. Contrary to belief, little is known about the biology of many of the sharks listed.

While several inconsistencies are apparent for some species' descriptions, ranges, or accepted scientific name, this attractive volume will help many in determining the identity of the sharks they see, land, or study. Castro's *Sharks of North America*, along with Casey's (1964) *Anglers Guide to Sharks of Northeastern United States*, and Schwartz's (1978) *Sharks of North Carolina and Adjacent Waters* will speed identification of sharks found in western Atlantic by the layman, skin diver, or scientist. Waterproof paper should be used in any future edition to prevent water damage when carried in the field. The cost is reasonable and size commendable. (*Frank J. Schwartz, Institute of Marine Sciences, University of North Carolina, Morehead City, NC*)

Mohlenbrock, Robert H. 1983. **Where Have All the Wildflowers Gone?** Macmillan Publishing Co., Inc., New York, N.Y. 10022. \$15.95. 239 pp. illus., hardcover.

An understanding of endangered species has long eluded politicians, Interior Secretaries, and the public. The definitions usually heard are in legalese, only hinting at biological reasons, or in a scientific language inaccessible to most. In the void, the public has responded with images of snail darters; where species protection conflicts with a major construction project.

For plants, Dr. Mohlenbrock's book will help in communicating the concept of endangered species. It is an excellent region-by-region guide to many wildflowers currently listed on state or federal lists; easily read and understood, personable, and accurate. Each species is provided a brief taxonomic description, excellent historical notes, details describing the reason for its endangered status, an estimate

of population size, and many times personal asides of the author. The species are illustrated by line drawings (done by Mark Mohlenbrock) and color photographs. Even poetry is included, from Charles Osgood's lines on the Furbish Lousewort ("And since the Furbish lousewort is endangered as can be, They had to call the dam off; couldn't build it, don't you see. For to flood that lousewort haven, where the Furbishes were at, Would be to take away their only extant habitat.") to Mohlenbrock's own rhymes ("And they surely would be missed, they surely would be missed.").

The book excels in its description of the threats to these rare plant species. While rarity is common in a world of numerous habitats and species of different abundance, it is the human-caused threats that make a rare species endangered. Mohlenbrock provides the examples of dams, drainage of wetlands, trampling, and collection. And he provides details that convince the reader that urgent action is needed to ensure the survival of these species for future generations.

The shortcomings and deletions of the book are few. The uniqueness and rarity of the habitat in which many of these species occur is not always emphasized. And while the threats are adequately described, the different means of protection, federal listing, recovery plans, land acquisition, and landowner protection, are not. Explaining the successes of protection efforts could do much to dispel the myth of the snail darter. Lastly, there are several minute inaccuracies in the book concerning species status, population size, and current protection.

Mohlenbrock's book excels in its goal to provide a region-by-region guide to endangered plant species. It's an important contribution to the education of the public concerning endangered plant species. (*Robert D. Sutter, Plant Conservation Program, North Carolina Department of Agriculture, Raleigh, NC*)

News of Biology in the Southeast

JON R. FORTMAN—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

The University of Alabama, Department of Biology. *Dr. Harriett Smith-Somerville* has been awarded a 3 year grant from NSF to expand her work on membrane changes during the microstome-macrostome transformation in the protozoan, *Tetrahymena vorax*.

Georgia

Valdosta State College, Department of Biology. *Dr. Bryan T. Britten* (Ph.D., University of Wyoming) was appointed Department Head and Professor. Dr. Britten comes to Valdosta State from Niagara University with a field of specialization in animal ecology. Dr. Britten succeeds *Dr. Clyde E. Connell*, who retired and now lives in Naylor, Georgia. *Dr. Dennis A. Bogyo* (Ph.D., SUNY at Buffalo) has joined the faculty as Assistant Professor. He previously held a research associate position at SUNY's College of Environmental Sciences and Forestry at Syracuse. His research interests are concerned with cell-mediated immune responses. The VSC Herbarium, curated by *Dr. Wayne R. Faircloth*, announces the gift from *Dr. Robert K. Lampton* of his personal bryophyte collection and library. The Lampton collection contains more than 5000 packets representing mosses and liverworts, mostly from Georgia, but also from other areas of the United States, Canada, Arctic America, Japan, and Mexico. Dr. Lampton lives in retirement at Boca Raton, Florida, and was formerly Professor of Biology at West Georgia College in Carrollton. The Biology Department, with *Professor Bette Bechtel* in charge of local arrangements, hosted the Southeastern Gopher Tortoise Council in October 1983. A new technique for examining gopher tortoise burrows was discussed and demonstrated. The recently perfected fiber optic television probe, developed by *Dr. Dan Speake* of Auburn University, permits complete inspection of burrows without excavation.

Louisiana

The University of Southwestern Louisiana, Department of Biology. *William D. Reese's* book, entitled, *Mosses of the Gulf South*, will be released by Louisiana State University Press in January, 1984.

Louisiana State University, Department of Botany. *Keith Clay* (Ph.D., Duke University), population biologist, and *Mary Jane Saunders* (Ph.D., University of Massachusetts), cell biologist, have joined the department. Recent LSU speakers at national and international symposia have been *Shirley C. Tucker*, *Thomas S. Moore*, and *Russell Chapman*. *Meredith Blackwell* was awarded the Alexopoulos Prize for research by the Mycological Society of America.

Tulane University, Department of Biology. *Alan J. Biel* (Ph.D., Purdue University) Microbiologist, and *John W. Fuseler* (Ph.D., University of Pennsylvania) Cell Biologist, have recently joined the faculty.

Mississippi

The University of Mississippi, Department of Biology. *Dr. William B. Keith* received a grant to study whether Marijuana use during the onset of puberty has irreversible effects. *Dr. Lyman Magee*, Professor of Biology, is President Elect of the Mississippi Academy of Sciences for 1983-84. *Dr. Craig*

A. Busack (Ph.D., University of California at Davis) has joined the faculty as an Assistant Professor. He previously held a postdoctorate post at the Pacific Biological Station, Nanaimo, British Columbia. His research interest is the genetics of marine and freshwater organisms. *Dr. Edmund D. Keiser* is serving as Chairman of the Department of Wildlife Conservation this year.

North Carolina

University of North Carolina at Wilmington, Department of Biological Sciences. *Professor Armando A. de la Cruz* is the Foundation Chair, Distinguished Visiting Professor for the 1983–84 academic year. *Dr. Nagendra Bhardwaj* from the University of Jaipur, India, has joined Professor de la Cruz as a one-year postdoctoral fellow. *Dr. David G. Lindquist*, Associate Professor, presented invited papers to the Third International Artificial Reef Conference. *Drs. Courtney T. Hackney* and *Thomas H. Shafer* received a contract from the North Carolina Department of Natural Resources to study the effects of a large oil spill (June 1983) on low salinity marshes. *Dr. Ronald K. Sizemore* received a grant to sponsor visiting industrial scientists in Biotechnology for the 1983–84 academic year. The National Undersea Research Program is now operational. *Dr. Lawrence B. Cahoon* is currently studying Demersal Zooplankton and Benthic Primary Production on the continental shelf. *Mrs. Anne Kendrick* was recently appointed Assistant Professor, and *Dr. John J. Manock* joined the faculty in December as Director of Research Administration.

Western Carolina University, Department of Biology. *Drs. James W. Wallace* and *J. Dan Pittillo* will be at Yunnan University, Kunming, Peoples Republic of China, during Spring Semester, 1984. They will be carrying out research projects under WCU–Yunnan University exchange program. *Dr. John D. McCrone* recently attended the International Biosphere Reserves Program in Russia where he presented a paper on his work in the Southern Appalachians. *Dr. Ronald R. Cowden*, East Tennessee State University, and *Dr. Frederick W. Harrison* have coedited the 1983 Symposium volume of the American Microscopical Society. The title of the book is *Recent Advances in Microscopy*. It will be published by Alan R. Liss Publishers, and will be available during Spring, 1984.

North Carolina State University, Department of Botany. *Dr. Ralph L. Mott* was appointed on the newly formed Biotechnology faculty of NCSU. The Biotechnology program will offer a minor in the area for advanced degrees. *Dr. Mott* was invited to Brazil to look over several tissue culture and tree production operations in that country. *Dr. W. Scott Chilton* was appointed to our faculty as a Visiting Professor. His area of specialty is secondary plant products. *Dr. Joe E. Varner* of the University of Washington will be on our faculty as Distinguished Professor of Plant Physiology during part of the Spring 1984 semester. He and *Dr. Chilton* will teach an advanced plant metabolism course. *Dr. Diana Freckman* of the University of California, Riverside, will be visiting the department during the Spring 1984 semester, and she will work with *Dr. James Reynolds* on ecosystem modeling problems.

Tennessee

Memphis State University, Department of Biology. *Dr. Donald D. Ourth*, Professor of Biology, has received a grant from the USDA to investigate the molecular mechanisms of bacterial pathogenicity and immunity to disease by the alternative complement pathway in channel catfish. *Dr. Ourth* was the 1981 recipient of the University's Distinguished Research Award.

Virginia

University of Richmond, Department of Biology. *Dr. William S. Woolcott* has been awarded the Distinguished Educator Award. This distinction was the result of his selection from among those nominated by the students, faculty, alumni, administration, and board of trustees. *Dr. David W. Towle* was an invited lecturer at the meeting of the European Society of Comparative Physiology and Biochemistry, held in Taormina, Sicily. *Dr. John Bishop* is serving as the coordinator for the development of exhibits at the Science Museum of Virginia regarding the James River and its influence in the state. *Dr. Joseph C. Mitchell*, Research Associate, received a grant to study the natural history and ecology of Virginia reptiles and amphibians, which will culminate in a book on the subject. At the May meeting of the Virginia Academy of Science, *Dr. Francis B. Leftwich* was selected as President Elect to assume the duties of President at the 1984 meeting. *Dr. R. Dean Decker* continues to serve as the Director of the Virginia Junior Academy of Science.

Washington, D.C.

Howard University, Department of Botany. New faculty members are *Dr. Carolyn Cross*, plant ecology, and *Dr. Roosevelt Johnson*, microbiology. *Dr. Lafayette Frederick*, Department Chairman, is on sabbatical leave for the 1983–84 academic year. *Dr. Frederick* is spending the year in the Department of Microbiology at the University of Georgia with *Dr. Ivan L. Roth*, Professor of Microbiology and Electron Microscopy. *Dr. Frederick*, *Dr. R. S. Dwivedi*, *Dr. William R. Gordon*, *Dr. Raymond Petersen*, and *Dr. John P. Rier, Jr.* have received an NSF grant to study morphogenetic and biochemical mechanisms of development in plant and fungal systems.

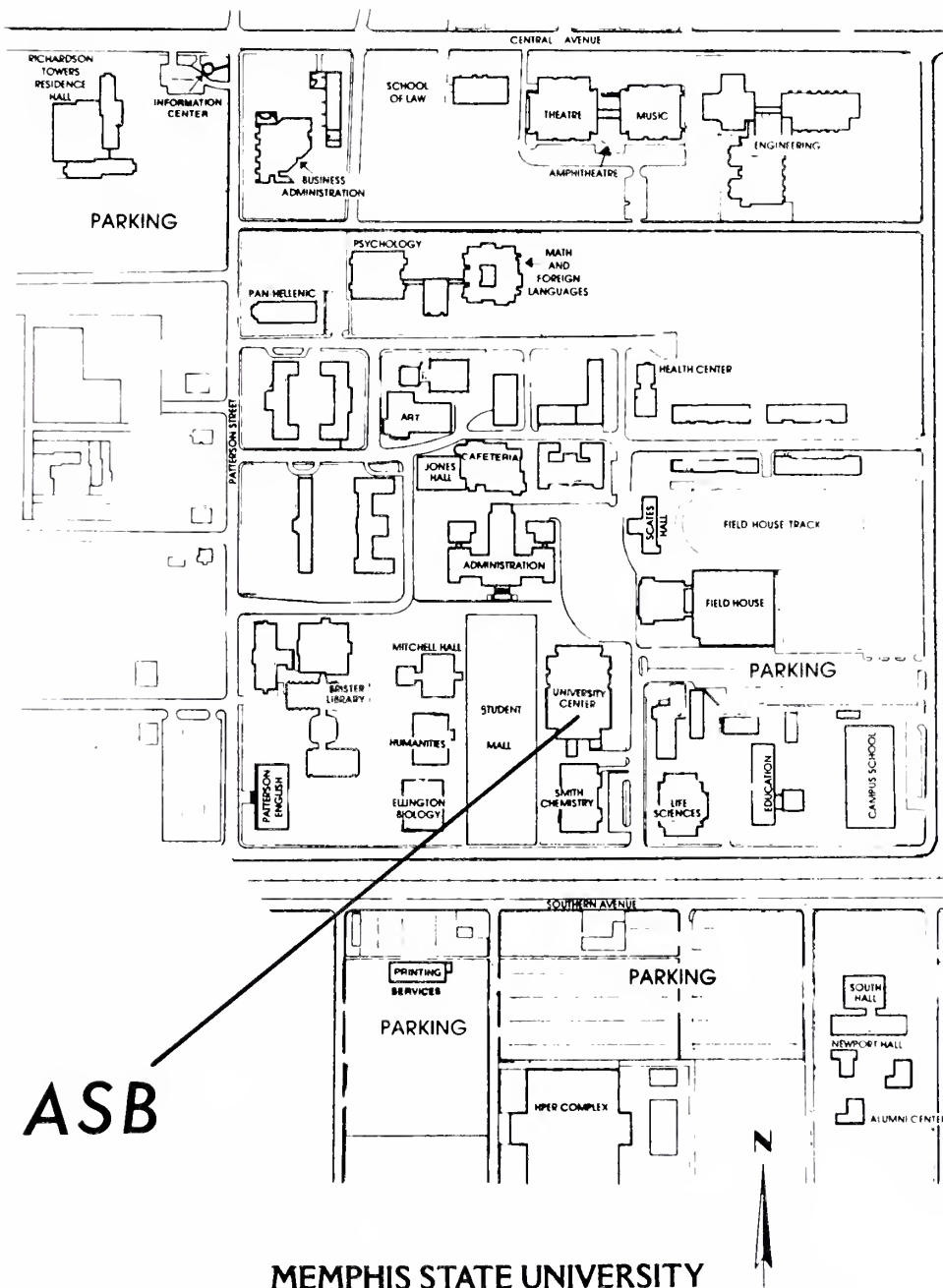
ABOUT MUSEUMS AND BOTANICAL GARDENS

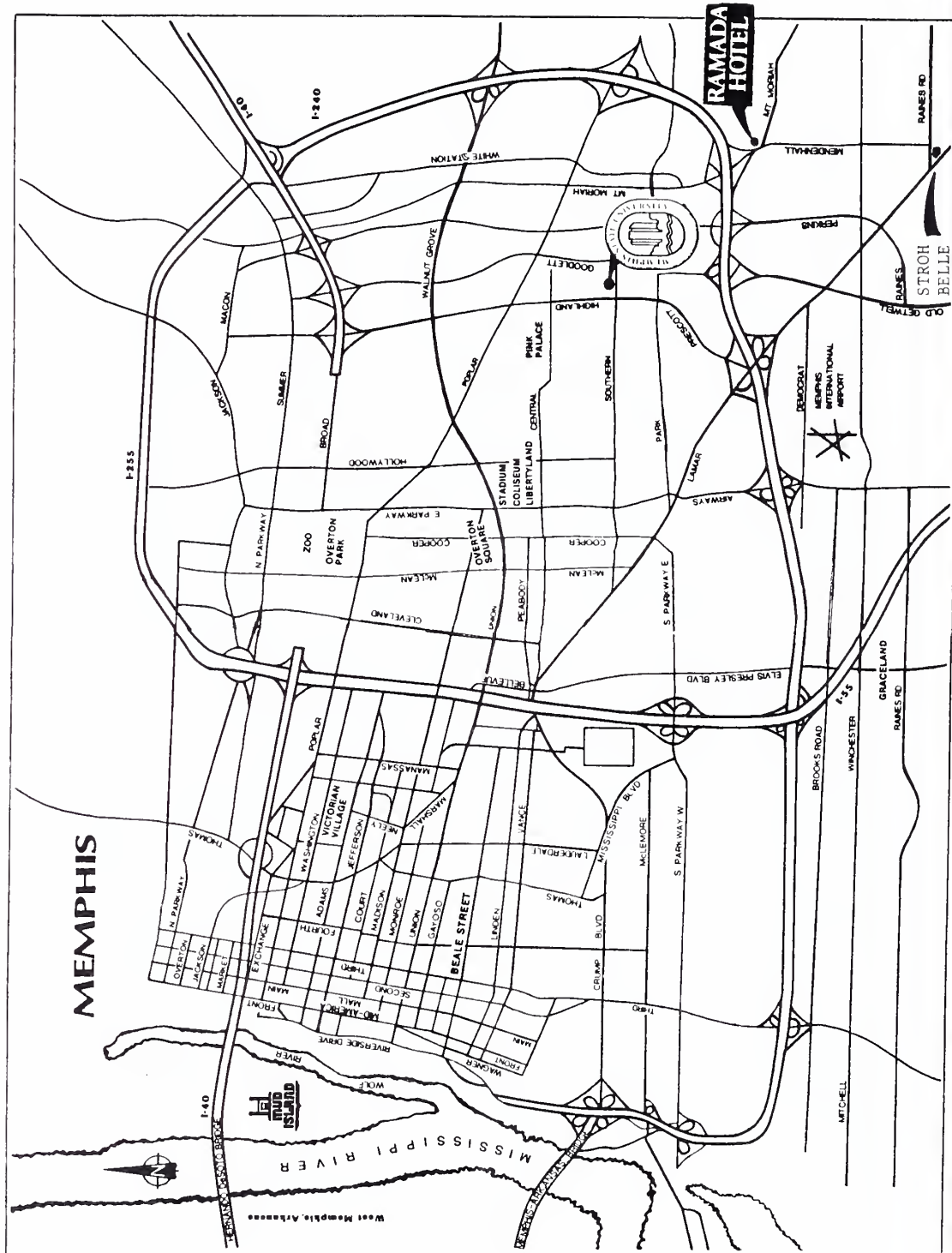
Alabama

Anniston Museum of Natural History. The Spring 1984 schedule will be as follows: Feb. 9th, Circa Lecture, "Southern Jewelry from Civil War to Present"; Feb 11th, Ethnic Festival; March 8th, Circa Lecture Series, "The Homes of Southern Accents"; March 15–April 29, Robert Bateman Exhibit; April, Conservation Workshop; and in August, Anniston Museum Day.

Florida

Florida State Museum, University of Florida, Department of Natural Sciences. *Dr. John F. Eisenberg*, world-renowned mammalogist, recently joined the FSM staff as the eminent scholar in the \$1 million Katharine Ordway Teaching Chair of Ecosystem Conservation. *Katharine Ordway*, the late 3M Corporation heiress, was an avid naturalist whose will established the Goodhill Foundation. This foundation donated \$5.25 million to the University of Florida in 1980. The University used part of the money to purchase 6,145 acres of virtually untouched north central Florida lakes, sandhills, marshes, and prairies 20 miles northeast of Gainesville. At the same time, UF assumed stewardship of an adjoining 2,920 acres, called the Swisher Memorial Preserve, through an agreement with The Nature Conservancy in Washington, D.C. Together, this acreage has given the University a 9,095 acre outdoor laboratory, that in part, represents what much of north central Florida must have been like before the arrival of the Europeans. The combined preserves will be managed overall by the Florida State Museum, the School of Forest Resources and Conservation, and a Board of Managers. However, the day-to-day supervision and coordination of research projects will fall to Eisenberg. The Preserve is home to many of the plants and animals that are unique to Florida. Research will include projects ranging from interrelationships between plants, soil, and water to in-depth studies on the natural history of many of the over 200 wildlife species that exist on the preserve.





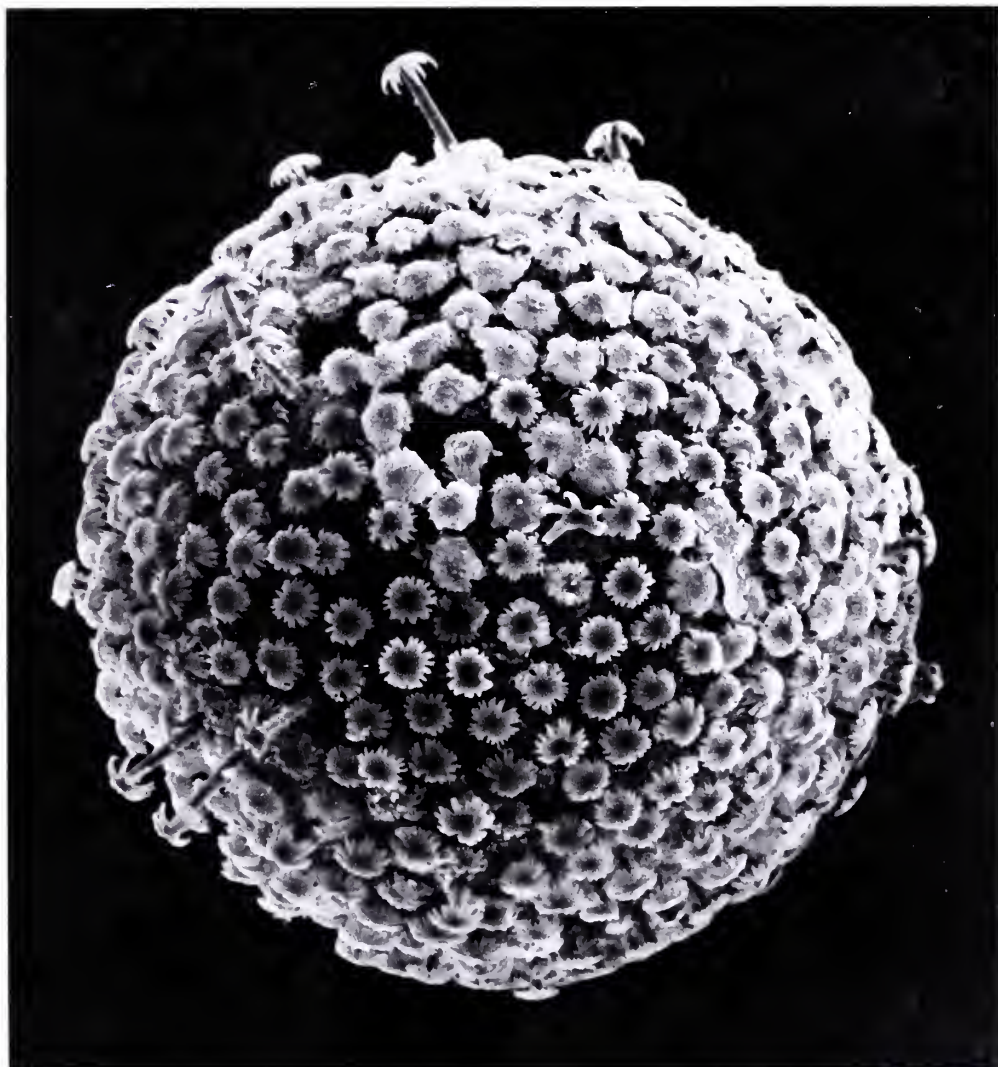
The ASB

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BULLETIN

Volume 31, Number 3

July 1984



Gemmule of a freshwater sponge

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*The Official Quarterly Publication of
The Association of Southeastern Biologists*

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Lawrence, Kansas in January, April, July, and October. Letters and other contributions, as well as all communications about editorial matters should be addressed to Dr. James W. Hardin, Department of Botany, North Carolina State University, Raleigh, NC 27695-7612. News items should be sent to the News Editor, Dr. Jon Fortman, Department of Biological Sciences, Mississippi University for Women, Columbus, MS 39701. Inquiries about missing numbers and other circulation matters should be addressed to Ms. Dorothy Hubbard, Circulation Manager, The Academy of Natural Sciences of Philadelphia, 19th and the Parkway, Philadelphia, PA 19103. Subscription orders from institutions should be sent to the Business Manager, Dr. R. L. Beckmann, Department of Botany, N.C. State University, Raleigh, NC 27695-7612. Subscription rate for non-members of the ASB: \$12.00 per year. Printing and typography by Allen Press, Inc., Lawrence, KS.

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JAMES W. HARDIN

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AAAS Representative, Section G —

Lafayette Frederick, Botany, Howard University, Washington, DC 20059

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COVER

Scanning electron micrograph, $\times 275$, of a gemmule of *Dosilia radiospiculata*, a freshwater sponge collected in southern Louisiana. Two forms of birotulate spicules (long and short) are visible in the pneumatic layer. Courtesy of Leon Duobinis-Gray, Department of Zoology and Physiology, Louisiana State University, Baton Rouge, LA 70803-1725.

TIME AND PLACE OF FUTURE MEETINGS

1985	April 10-13	Middle Tennessee State University, Murfreesboro
1987		University of Georgia, Athens (50th Anniversary)

PATRON MEMBERS

Carolina Biological Supply Company, Burlington, NC
Martin Instrument Company, Greenville, SC
Beckman Instruments, Incorporated, Norcross, GA



At the Memphis Meeting

1984 MERITORIOUS TEACHING AWARD



Dr. Robert H. Mohlenbrock

Dr. Robert H. Mohlenbrock was this year's recipient of the Association's Meritorious Teaching Award. The award was presented by Dr. Sandra T. Bowden, chair of the committee. The award consisted of recognition at the annual banquet, a certificate, and \$1000.00 presented by the sponsor, Carolina Biological Supply Co.

Dr. Mohlenbrock, a native of Murphysboro, Illinois, received his education at Southern Illinois University and Washington University, St. Louis (Ph.D., 1957). He has taught for twenty-seven years in the Department of Botany at Southern Illinois University. During this time, seventy-one graduate students have completed work under his direction. He has worked for many years on the systematics of tropical legumes and is the author of more than two hundred and fifty publications, including thirty books, ten of which are in the *Illustrated Flora of Illinois* series.

As a teacher, Dr. Mohlenbrock has been described by former students as being concerned and accessible, enthusiastic and inspirational, and as one who has exemplified excellence in scholarship in his professional life. Many of his former students have pursued productive careers in botany and related areas. Several of Dr. Mohlenbrock's former students are members of ASB and were with him at the award presentation.

RESEARCH AWARDS

The 1984 ASB Research Award to faculty members was presented to *Dr. James W. Ross* of Benedict College, Columbia, SC, and his co-authors *Robert H. Suehisa* and *Harry Y. Yamamoto* of the University of Hawaii. Their award-winning paper was "*The addition of monogalactosyldiacylglycerol to chloroplasts: effects on some photochemical activities*" the abstract of which is presented below.

Monogalactosyldiacylglycerol (MG) is the most abundant lipid in thylakoids but unlike the other thylakoid lipids, it does not form bilayers in aqueous suspension. This investigation showed that purified MG is also unique in being the only chloroplast lipid that adds to thylakoids without the aid of additional techniques to disrupt the membrane such as freeze-thaw or the use of detergents. The only detectable effect of this addition was the inhibition of proton pumping as seen by the inhibition of light-driven violaxanthin de-epoxidase activity, neutral red uptake, and 9-aminoacridine fluorescence quenching. There was no inhibition of the photosystems or electron transport, and no structural change was detected. Since this lipid can form hexagonal-II phase structures which have a central aqueous channel, it was concluded that MG binds to the membrane and therein acts as an ionophore causing the free movement of protons within or across the membrane. It is suggested that this channel forming ability could be an important functional property of MG for proton translocation in chloroplast membranes.

The 1984 Student Research Award, sponsored by **Martin Instrument Company** of Greenville, SC, was presented to *Mr. G. Frank Yelverton*, who is now with the Army Corps of Engineers in Wilmington, NC. The research represented part of his M.S. thesis at the University of North Carolina at Wilmington. *Dr. Courtney T. Hackney*, Assoc. Prof. Biology, UNC-W, was co-author of the award-winning paper "*Export of dissolved organic carbon (DOC) from the substrate of a North Carolina salt marsh.*" The abstract is below.

The export of DOC from a sandy substrate, Spartina alterniflora marsh was studied from August 1982 through July 1983. DOC was reliably estimated by measures of fluorescence and absorbance of the pore water. DOC ranged between 1 and 6 mg per l and was highest during the summer and lowest in the winter. Pore water movement was estimated by two different methods. Over 26,000 l of water were exported from a 1 m wide transect according to one method and 34,000 using the second method. Most of this water movement (over 80%) occurred within 4 m of the edge of the creek. The transport of carbon as DOC from the marsh substrate accounted for less than 1% of the net primary production of the roots and rhizomes of this community.

1984 COMMERCIAL EXHIBITORS

Addison-Wesley Publishing Co.
AO Reichert Scientific Instruments
Advanced Scientific, Inc.
Beckman Instruments, Inc. (**Patron**)
Burgess Publishing Co.
Carolina Biological Supply Co. (**Patron**)
Continental Water Conditioning Co.
Delta Biologicals
E. I. Dupont De Nemours & Co., Inc.
Forestry Suppliers, Inc.
Harcourt Brace Jovanovich Publishers
Hewlett Packard Co.
Hunter Textbooks, Inc.
Martin Instrument Co. (**Patron**)
Charles E. Merrill Publishing Co.
C. V. Mosby Co.
Parco Scientific Co.
Preiser Scientific, Inc.
Southern Biological Supply Co.
Southern Micro-Instruments
UTCHS Department of Anatomy
UTCHS Graduate School
Vashaw Scientific, Inc.
Wadsworth Publishers, Inc.
Wilco Wildlife Supply Co.
Worth Publishers

EMERITUS MEMBERS

A member of the ASB for ten or more years and who has retired from professional duties is eligible for election to Emeritus Membership with exemption from dues. Those wishing such designation should make this request to the Treasurer. The following members were elected at the meeting in Memphis:

Lewis Berner, University of Florida
Dorothy C. Bliss, Randolph Macon Woman's College
Robert R. Bryden, Guilford College
Thomas P. Copeland, East Tennessee University
Julian T. Darlington, Southwestern at Memphis
Walter S. Flory, Wake Forest University
Lauren C. Gilman, University of Miami
George K. Reid, Eckerd College

NECROLOGY

During the past year, the ASB lost the following members by death:

Harry J. Bennett, Louisiana State University

Annie L. Richardson, Norfolk State College

RESOLUTION

The following resolution, presented by the Conservation Committee, was passed unanimously by those members attending and voting at the annual business meeting on April 13, 1984.

Whereas there are many scientific and social needs for taxonomic research and services for all major groups of plants and animals; and,

Whereas there is deep concern about the state of systematic biology in the United States today; and,

Whereas there are many hundreds of thousands of living species of organisms, many of which are undescribed or incompletely described; and,

Whereas many of these have major economic impact on mankind, through their medical, veterinary, agricultural, and silvicultural importance; and,

Whereas surveys and the production of identification manuals for all these groups are needed in the United States in order to provide basic information for research, action programs, and conservation; and,

Whereas these needs could be met with the initiation of taxonomic research and services, surveys, and the publication of reference works such as the Biological Survey of Canada; therefore,

Be it resolved that the Association of Southeastern Biologists recommends to the Government of the United States and its granting agencies that they recognize the fundamental importance of and the need to support taxonomic research and services, faunal and floral surveys, the establishment of a national data bank, and the production and publication of atlases, monographs, and identification manuals.

TREASURER'S REPORT

1 Jan. 1983 - 31 Dec. 1983

I. SAVINGS ACCOUNT

A. Merrill-Lynch Ready Assets Trust	
Balance Jan. 1, 1983	\$11,275.89
From Checking to Savings, Net	(1,480.39)
Interest 1983	<u>731.43</u>
Balance in Savings Dec. 31, 1983	10,526.93

II. CHECKING ACCOUNT

Balance on Hand, Jan. 1, 1983		\$157.90	
A. Receipts			
Regular Dues/Subscriptions	10,764.00		
Annual Meeting, Lafayette LA	2,309.61		
Honorarium Reimbursement	250.00		
(Botanical Soc. of America)			
Bulletin Page Charges	1,250.00		
Payment for Mailing Lists	15.00		
Payment for Booths	300.00		
Payment for Abstract Forms	<u>3.60</u>		
TOTAL RECEIPTS		\$14,892.21	
TOTAL RECEIPTS AND BEGINNING BALANCE			\$15,050.11
B. Disbursements			
1. Membership Cultivation			
Printing & Mailing, Call for Dues	\$572.09		
Printing & Mailing, Call for	689.95		
Papers	<u></u>		\$1,262.04
2. Publication			
ASB Bulletin (Vol. 30) Printing	11,259.21		
Roll Maintenance for Bulletin	29.21		
Mailing	<u></u>	11,288.42	
3. Office Expenses			
Treasurer	176.29		
Editor	71.26		
Other Officers	116.46		
Bank Charges	<u>77.00</u>		
		441.01	
4. Travel and Related Expenses			
Student Travel Awards	1,297.28		
April Speaker Honorarium	<u>500.00</u>		
		1,797.28	
5. Research Awards			
		1,000.00	
6. Reimbursements (Booth Payments and Miscellaneous)			
		<u>310.00</u>	
TOTAL			16,098.75
TOTAL TRANSFERRED TO SAVINGS			(1,480.39)
TOTAL DISBURSEMENTS			14,618.36
(BALANCE IN CHECKING Dec. 31, 1983)			431.75
TOTAL ASSETS			\$10,958.68

Respectfully submitted,

Charles O'Kelley

J. Charles O'Kelley
Treasurer, 1983

Association Affairs

A VIEW FROM HERE

The Association, in my opinion, has rarely if ever been healthier than at present. We are financially solvent, but not rich. The *Bulletin* is expanding its scope. We are constantly seeking and finding new ways to serve biology and biologists in the Southeast.

The Officers, Committee Members, and Members of the Association are all responsible for its well-being. There is no way I can recognize all of you for your contributions. I do wish, for all of us, to express appreciation to Charles Jenner, our immediate Past President, for his leadership in the year just completed.

The Memphis Meetings

Everyone who attended the meeting at Memphis State University will join me, I am sure, in wishing to express our appreciation to the Local Arrangements Committee, led by James F. Payne and Delano Black, for an outstanding meeting. We appreciate both the efficiency and the hospitality shown by Memphis State University and the city of Memphis. The new standards they set will be hard to follow.

I think we hit a new high for distinguished speakers. Our keynote speaker, George M. Woodwell, gave an excellent informed and reasoned address on the role of the biota in affecting the level of atmospheric CO₂. As biologists, we must interpret this issue to non-biologists, who appear to have great difficulty understanding what is involved.

We were also most fortunate to have Eugene Odum as our speaker at the luncheon meeting of the Southeastern Chapter of the Ecological Society of America.

The Bulletin

James Hardin is continuing to do a great job editing the *Bulletin*. As you probably have noticed, he is expanding the *Bulletin* to include research and review articles that will be of particular interest to biologists in our area. He can expand the usefulness of the *Bulletin* in this way only if you are willing to submit articles. The lead time for publication is currently about six months. If you have an appropriate paper, I encourage you to communicate with him about having it published in the *Bulletin*.

Awards

The Meritorious Teaching Award (this \$1000 award is supported by Carolina Biological Supply Company) went this year to another distinguished teacher. This is our most prestigious award. I want to urge you, if you were educated in the Southeast, to nominate next year your most meritorious teacher of biology for this award.

The ASB Research Award (a \$500 award), open to papers submitted in writing and presented orally at the annual meeting by any member of the Association, has also become an ASB tradition. Again, I urge you to consider submitting your best work for this award next year.

Two years ago (as a consequence of the generosity of Martin Instrument Company) ASB established a second \$500 award for research, restricted to research by a student or students. The original ASB research award had been awarded several times to students, so I will leave it to you to decide whether the new award is intended to increase the odds for students or for the rest of us. This is our newest tradition in the making. By all means encourage students to enter their research in competition for this award.

Plans are underway for establishing an award for an outstanding paper (presented orally at the meeting) in a particular biological discipline to be identified soon.

In later *Bulletin* issues you will see details about these awards. Help us recognize the very best in the Southeast by placing your favorite teacher or your own research under consideration for the appropriate award.

An ASB Endowment Fund

We have been working for more than a year on plans to establish an endowment fund in ASB. Members would then have the opportunity to contribute to a fund in which the principle would continue to accumulate, while interest earned could be used to support appropriate Association endeavors. We envision setting up several sub-funds, such as a fund for paying an honorarium and expenses to our annual keynote speaker, a fund to increase support of each of our existing annual awards, and perhaps an undesignated fund. Under this plan the donor could support the endeavor in which he/she had the most interest. We would need a Board of Directors selected so that there would be considerable continuity, with one Board member experienced in investing and empowered to manage the funds.

These plans are in the hands of an ad-hoc committee chaired by William Grant. Establishing the fund will require an amendment to our Constitution and By-laws. We hope that plans to do this can be brought to the attention of members before the April 1985 meeting, so that an amendment can be submitted for a vote next April.

If you have suggestions about the proposed Endowment Fund, including activities that might be supported by the fund, please let us hear them soon.

Membership

Only Robert Beckmann (our Treasurer) and Rebecca Sharitz (our Secretary), or those who have had these jobs previously, know how much membership turn-

over exists in ASB. Of course old members retire and become Emeritus. Mostly, however, we lose members who should remain actively affiliated. New members are needed to replace those who drop their membership for whatever reason. New members bring new ideas. For these and other reasons new members are the life blood the Association must have to continue to thrive. Nearly all of us are in Departments or groups that include colleagues who do not belong to ASB, but should. Let me urge you not only to keep your membership active but also to recruit new members and have your library subscribe to the *Bulletin*. Robert Beckmann has copies of our recently updated brochure that includes membership application forms. Upon request he will send you as many as you need. Membership forms may be found also in the *Bulletin*.

The 1985 Meeting

Next year, April 10–13, we will meet on the campus of Middle Tennessee State University at Murfreesboro. There is easy access to Murfreesboro because it is only about 30 miles from Nashville. The Local Arrangements Committee is being chaired by George Murphy. Plans are already underway for another outstanding meeting. Lafayette Frederick (President-Elect) and Gene van Horn (representing the Southeastern Section of the Botanical Society) are at work selecting a keynote speaker for next year.

The Program Committee, chaired by Mary Dunn, is already planning the rest of the program. A new idea for part of our program (this has been endorsed by the Executive Committee) is to include a session (either contributed papers or a symposium) dealing with the use of minicomputers (personal or small business type) in biological research and teaching. Along with this we plan to solicit commercial exhibitors who will bring minicomputers and appropriate software to our meetings. If you have suggestions or want to participate in developing this program please contact Mary Dunn or Kenneth Shull (Biology, Loyola University, New Orleans).

You can help us make next year's meeting as successful as the one we just had in Memphis. Plan now to attend and to give a paper. We want to know what you are doing to advance the science of biology!

—Charles O'Kelley, President

ASB OFFICERS, COMMITTEES, AND REPRESENTATIVES: 1984–1985

President—J. Charles O'Kelley, Biology, The University of Alabama, University, AL 35486 (205/348-5960 or 553-1171).

President-Elect—Lafayette Frederick, Botany, Howard University, Washington, DC. 20059 (202/636-6929).

Vice-President—Sharon Patton, Veterinary Pathobiology, University of Tennessee, Knoxville, TN 37916 (615/546-9230, ext. 339).

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Secretary—Rebecca R. Sharitz (1985), Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29801 (803/450-6211).

The ASB Bulletin

Volumes 26-30
1979-1983



Published by
The Association of Southeastern Biologists, Inc.
James W. Hardin, Editor

Subject Index to Volumes 26–30, 1979–1983

Compiled by Dorothy J. Hubbard

This is the sixth of a series of five-year indices planned for the *ASB Bulletin*. The author index has been omitted for Volumes 26–30, and the subject index does not include abstract titles. Those who plan to bind the *Bulletin* should note that this index and title page can be removed and bound with Volumes 26–30 without disturbing the sequence of pages.

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- Treasurer**—Robert L. Beckman (1986), Botany, North Carolina State University, Raleigh, NC 27695-7612 (919/737-3341).
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- W. H. Martin (1986), Natural Areas, Eastern Kentucky University, Richmond, KY 40475 (606/622-1476).
- Joe E. Winstead (1986), Biology, Western Kentucky University, Bowling Green, KY 42101 (502/745-3696).
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- Priorities in Public Affairs Committee**—*Chairperson*: Lafayette Frederick, Botany, Howard University, Washington, DC 20059 (202/636-6929).
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- Research Awards Committee—Chairperson:** Donald C. Tartar (1985), Biology, Marshall University, Huntington, WV 25701 (304/696-3148); Richard L. Buckner (1986), Natural Science and Math, Livingston University, Livingston, AL 35470 (205/652-9661); Stewart A. Ware (1987), Biology, William and Mary College, Williamsburg, VA 23185 (804/253-4458).
- Resolutions Committee—Chairperson:** Charles E. Jenner, Biology, University of North Carolina, Chapel Hill, NC 27514 (919/962-1350 or 962-2077); George G. Murphy, Biology, Middle Tennessee State University, Murfreesboro, TN 37132 (615/898-2847); Rowland M. Shelley, North Carolina State Museum of Natural History, P.O. Box 27647, Raleigh, NC 27611 (919/733-7450).
- Student Awards Committee—Chairperson:** Ronald V. Dimock, Jr. (1985), Biology, Wake Forest University, Winston-Salem, NC 27109 (919/761-5000); Janice C. Coffey (1986), Science, St. Mary's College, Raleigh, NC 27611 (919/828-2521); Robert E. Daniel (1987), Biology, Murray State University, Murray, KY 42071 (502/762-2768).
- Editor, ASB Bulletin—**James W. Hardin (1986), Botany, North Carolina State University, Raleigh, NC 27695-7612 (919/737-2226 or 737-2727).
- Editor, News and Notes—**Jon R. Fortman (1989), Biology, Mississippi University for Women, Columbus, MS 39701 (601/328-0812).
- Archivist—**Madeline P. Burbanck (1986), Box 15134, Atlanta, GA 30333 (404/373-1413).
- AAAS Representative (Section G)—**Lafayette Frederick, Botany, Howard University, Washington, DC 20059 (202/636-6929).

WANTED—pictures depicting the history of the ASB

ASB will celebrate its 50th anniversary in 1987. The annual meeting that year will be held at the University of Georgia—the site of the first meeting on May 7 & 8, 1937. The *ASB Bulletin* will publish a history of the Association which is being written by Dr. Walter S. Flory.

Some illustrations would increase the attractiveness of, and interest in, this historical account. Group pictures (officers, field trips, gatherings, etc.) would be most appropriate. These should be black & white, glossy, unmounted prints, 4 × 5 inches or less, with the year and people identified as appropriate. Please send these to Dr. Walter S. Flory, Dept. of Biology, Wake Forest University, Winston-Salem, NC 27109. These will be returned to you only if requested. Acknowledgement will be given for those used. Please put the name of the contributor on the back of each.

CHANGE IN BILLING PROCEDURE

Due to the excessive cost of separate mailings, the regular annual dues notice will be sent to you with the **Call-for-Papers** in August. Please respond as soon as

possible to eliminate the expense of a second mailing. Those members who have not paid by December 1st will receive a second notice. ("Any member in arrears in the payment of dues for two (2) years at the close of the fiscal year shall be dropped from the membership roster at the close of the annual meeting for that calendar year"—Art. IV, Sect. 3.)

MERITORIOUS TEACHING AWARD 1985
CALL FOR NOMINATIONS
(Deadline: February 1)

Through the prestigious annual Meritorious Teaching Award sponsored by Carolina Biological Supply Co., the ASB recognizes excellence in the teaching of biology by one of its members. The Teaching Award Committee asks that you begin to give consideration to nominations for the 1985 award. The Committee seeks new nominations as well as the renewal of nominations that are *three years old or older*. Please take a moment to consider a worthy candidate and make the nomination.

Nominees must be ASB members who are active or recently retired and who have taught biology in a southeastern institution for at least ten years. Among types of evidence of the qualifications of the candidate are the progress of the candidate as indicated by recognition at his or her institution (important assignments and other contributions specifically related to effective teaching) and the quality of students for whom the nominee has provided inspiration for advanced study and careers in biology.

Nominators should complete the nomination in the call-for-papers or below and write a cover letter to accompany the form. *Nominators are to seek letters of support for a candidate and submit a current vita for the nominee to the Committee.* The letters, the form, and the vita are to be sent as soon as possible to:

Dr. Steve C. Dial
Dept. of Biology
Pfeiffer College
Misenheimer, NC 28109

NOMINATION—MERITORIOUS TEACHING AWARD 1985

NAME _____

ADDRESS _____

TEACHING INTERESTS _____

NAME OF NOMINATOR _____

ADDRESS _____

Book Reviews

Kaufman, P. B., T. L. Mellichamp, J. Glimm-Lacy, and J. D. LaCroix. 1983. **Practical Botany**. Reston Publ. Co, Inc., Reston, VA 22090. \$22.95. 455 pp. illus., hardback.

This book is advertised as an introductory text for "non-major botany and horticulture students." Hopefully, "non-major" applies to both the students in horticulture as well as those in botany, as I would much prefer to teach horticultural science from a more inclusive introductory horticulture text. Included are chapters on Plant Structure and Development, plant propagation, Soils, Houseplants, Home Landscaping and Management, as well as the more botanical topic of Plant Communities. Several other plant related chapters, such as Crafts and Dyes, Spice, Herb and Drug Plants, and Practical Plant Photography, are also included. Chapter 8, Plant Pests and their Control, contains timely mention of integrated pest management and alternatives to chemical pest control. There is an extensive use of tables and plant lists (unindexed), chapter references, and a glossary. The chapter on house plants is quite good, and the more botanical subject matter is mostly presented in a clear and concise manner except for some poor definitions in the glossary. The horticultural content is marred, however, by occasional lapses into imprecision and unsound or outdated recommendations. For example, considering the type of student for which this text is written, there is a glaring omission of any discussion on lawn installation and subsequent maintenance or turf grass alternatives. Turf areas are one of the most costly and labor-intensive parts of the home landscape, and to many, one of the most rewarding. The sample landscape plans use the euphemism "open space" instead of lawn, and indicate a poor use of four vigorous vines on a single 18 ft. section of fence. The instructions for planting nursery stock do not agree with the illustrations. In the discussion of plant pruning, a diagram for proper undercutting of limbs for removal would be useful. The statement is made, "It is not necessary to paint over wounds with tree paint. Healthy plants are perfectly capable of sealing their wounds with sap." The term "sap" is imprecise and colloquial, and this statement is undoubtedly based on the publications by Shigo *et al.* (not referenced) on wound healing, which are controversial and not universally accepted. The use of "dried sterilized manure" for high nitrogen feeders is recommended; however, this product is expensive and with little nutritive value. As this text is mostly horticultural in scope, one wonders where the fine line between "Horticulture" and "Practical Botany" can be drawn, and even what "impractical botany" might be. The book would be more readable and attractive with a different typeface and clear, contrasty black and white photos, and occasional use of color—features common in other texts in this same price range. Despite some of the problems, and with qualification, this text, and hopefully corrected subsequent editions, should fit the need for a general course for non-majors offered by a botany or biology department. (William H. Gensel, Dept. of Horticultural Science, North Carolina State University, Raleigh, NC.)

Troutman, M. B. 1981. **The Fishes of Ohio**. Ohio State University Press, Columbus, OH. \$32.50. 782 p.

Becker, G. C. 1983. **Fishes of Wisconsin**. The University Wisconsin Press, Madison, WI. \$75.00. 1052 pp.

Cooper, E. L. 1983. **Fishes of Pennsylvania and the Northeastern United States**. The Pennsylvania State University Press, University Park, PA. \$27.50. 243 p.

Three new volumes on fishes join the growing list of states with completed fish faunal studies. Troutman's **Fishes of Ohio** is an update of his 1957 work. It contains comments and descriptions of 179 fishes (166 species and 13 subspecies) now known within the state, as compared to 172 in the 1957 version. Troutman masterfully chronicles the changes in Ohio's fish fauna and stream ecology from 1750 to 1980 and attributes the changes to siltation, pollution, and changing urban-farm practices. He reviews the effects of glaciation and climate on the state's fish fauna as well as the changes in

scientific species names and nomenclature. Good keys and distribution maps supplement comments on each species. One disappointment remains. One expected more than just an update, for the fish drawings are still a composite mean of several body proportions rather than a depiction of a real fish.

Becker's **Fishes of Wisconsin** leaves one breathless by not only its size, 1052 pp., but by the scope and detail of information found on 157 species within 27 families. Added features are: great detail on glaciation, acid precipitation effects, pollution, eutrophication, early limnology, fish culture, fish kills, fishery management, exotic fishes, crossover connections, extirpated and endangered species, and parasites. The keys are workable and the volume is enhanced further by 172 color photos, some of which however, are too tan. The literature cited section contains a wealth of citations dealing with many freshwater fishes. I can only quibble in that even after this herculean task, many lakes and tributaries were yet unsampled. This volume is a classic and will serve as a monumental guide for others to follow.

Cooper's **Fishes of Pennsylvania** treats 159 species in 27 families. He notes 16 species extirpated from Pennsylvania's streams. Treatment is by species distribution, behavior, food, and value. Superficial comments cover glaciation, origin, and geographical dispersal. This is the poorest of the three works, for Pennsylvania's fish fauna has been well collected by Fowler, Raney, Lachner, the Pennsylvania State Fish Commission, myself and others, yet one does not get that impression from the distribution maps. The most serious detriment is the small streamless distribution maps that have dots scattered about by watershed. If one doesn't know the state, finding the dots for white bass or walleye pike and other fishes in Pymatuning Lake, one of the largest lakes in the northwestern part of the state, proves futile. Errors in the text are also common, *i.e.* for *Notropis rubellus*, the text says one locality known but the map shows two; *N. ariommus* also occurs in nearby West Virginia. The dot for the deepwater sculpin, *Cottus ricei*, and other fishes in Lake Erie, seems to be on the mainland rather than off Presque Isle. *Notemigonus crysoleucas*, the golden shiner, does occur in northwestern Pennsylvania. The work would have benefitted by including comments on the state's monumental efforts that led to restoration of American shad runs in the Susquehanna and Delaware Rivers and the detailed experiments to produce hybrid trout and salmon at the Bellefonte, Pa. hatchery. Contrary to its title, little deals with the fishes of northeastern United States. (*Frank J. Schwartz, Institute of Marine Sciences, University of North Carolina, Morehead City, NC.*)

Atlas, Ronald M. 1984. Microbiology: fundamentals and applications. Macmillan Publ. Co., NY 10022. 983 pp., hardback, illustr., \$34.95.

This is a lengthy book with an extensive glossary (38 pages) and added descriptions of bacterial genera (35 pages). It covers all aspects of microbiology from classification to genetic engineering. **Microbiology—Fundamentals and Applications** does indeed present a broad array of topics generally considered under several individual courses in a Microbiology curriculum. Although most of the areas are more than adequately presented, this book may overwhelm the beginning student and be somewhat too wordy even for those in advanced courses. This text could serve as a major reference book for the course instructor but there is some reservation regarding its employment as the text for students in an initial course in microbiology. An example of this concern is as follows: generally an introductory course in microbiology would have one lecture in microbial classification but this text covers the topic in 94 pages. Finding the essentials in this chapter would take considerable "sorting out." It would be a fine source book but not a textbook for a course. Perhaps in those instances where a beginning course in microbiology is taught over two semesters it would be more appropriate. If one wishes a book on the state of the art with a broad overview of microbiology, then this book would be worth the purchase price. (*Jerome J. Perry, Department of Microbiology, North Carolina State University, Raleigh, NC.*)

News of Biology in the Southeast

JON R. FORTMAN—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

Tuskegee Institute, Department of Biology. The Southern Section of the American Society of Plant Physiologists has awarded *Dr. James H. M. Henderson*, Professor of Biology, the Distinguished Service Award. Dr. Henderson, a former chairman of the Southern Section of the Society and member of the Executive Committee of the ASPP, was the fourth recipient of the award. He has been a member of the Society for over forty years. *Dr. R. W. Brown*, Emeritus Professor of Biology and former Director of the Carver Research Foundation as well as Vice President of Tuskegee Institute, and *Dr. J. H. M. Henderson*, Chairman of the Division of Natural Sciences, were among ten persons recognized by the Atlanta University Center Chapter of Beta Kappa Chi Scientific Honor Society in a recent meeting. Tuskegee Institute has been awarded a grant for over two million dollars from the National Institutes of Health, Division of Research Resources, Minority Biomedical Research Support Program. These funds, co-ordinated by Dr. Henderson, will be used to support several research projects on the campus.

Florida

University of South Florida, Biology Department. *Dr. Richard L. Mansell* has been elected to the office of President-Elect of the Phytochemical Society of North America. *Dr. David L. Hartnett* (Ph.D. University of Illinois) is a new faculty member whose research interests are in aspects of plant populations and community ecology, particularly the ecology of clonal plants and plant-herbivore interactions. *Dr. Clinton J. Dawes* has been elected to a 3-year term of the editorial board of the *Journal of Phycology*, and appointed to the editorial board of *Littoralia*. *Dr. William Gardnier* is now doing postdoctoral studies at the University of Nebraska. *Dr. Diane Testrake-Merner* attended the Third International Mycological Congress held in Tokyo, Japan and a Pre-congress Foray to the People's Republic of China.

University of Miami, Rosenstiel School of Marine and Atmospheric Science. *Dr. Lynn M. Walter* received the F. G. Walton Smith Prize of \$1000, which is awarded annually to a Rosenstiel School graduate for significant and original doctoral research. Dr. Walter conducted a laboratory investigation of the relative stability of biogenic carbonates, especially examining the effects of mineralogy, micro-structure, and solution chemistry. Her work will throw light on the development and preservation of porosity in limestones, thus on the potentiality of these rocks to store hydrocarbons. *Mr. Jeffrey Alt* received the Koczy Fellowship, a twelve-month stipend of \$12,000 plus tuition, which is given to a doctoral student at the School who has displayed exemplary scholastic and research ability, to enable him to continue his research without financial constraints. His dissertation research is aimed at understanding how submarine hydrothermal systems work and ascertaining the role that hydrothermal alteration of the oceanic crust plays in regulating seawater composition. The Rosenstiel School has initiated an annual award for the year's outstanding master's thesis. Called the Dean's Prize, it consists of a check in the amount of \$250, and a certificate of merit. The 1983 prize was won by *Kimberlee Miskell*, for her thesis, "Accumulation of Opaline Silica in Deep Sea Sediments from the Mid-Cretaceous to the Miocene; a Paleocirculation Indicator."

Georgia

Columbus College, Department of Biology. *Francis E. Gardner, Jr.* has been promoted to the rank of professor. Professor Gardner received his Ph.D. at the University of Illinois. Following postdoctoral work at the University of Georgia, Dr. Gardner joined the biology faculty in 1974. His research interests are in human exercise physiology. He was named "Educator of the Year" in 1983.

Louisiana

University of Southwestern Louisiana, Department of Biology. *Steven Craig Hand* has been awarded a grant from the National Science Foundation, to study carbohydrate metabolism in brine shrimp during the cryptobiotic-active life transition. *Roy Curtiss Brown* and *Betty E. Lemmon* also received an NSF grant to continue their studies of comparative sporogenesis in bryophytes.

Southern University and A&M College, College of Agriculture. *Dr. Jay Van Huizen Huner* has received the NAFEO Research Achievement Award for 1984. He has been on the faculty since 1975. He received his B.S. and Ph.D. from Louisiana State University. He is the recipient of the Distinguished Service Award from the American Fisheries Society (1981), two publication awards from the Louisiana Wild Life Biologists Association in 1978, 1981, and a Fellowship from the Academy of Finland to study Crayfish Biology. He is the co-author of *Red Swamp Crayfish: Biology and Exploitation* with James Barr.

Tulane University, Office of the Dean, College of Arts and Sciences. *David C. Heins* of Tulane University and *William J. Mathews*, The University of Oklahoma Biological Station, are planning a national symposium entitled, "Evolutionary and Community Ecology of North American Stream Fishes." The symposium will be held during the 1985 annual meeting of the American Society of Ichthyologists and Herpetologists in Knoxville, Tennessee.

Mississippi

Gulf Coast Research Laboratory, Ocean Springs. Recent findings of a series of experiments by *Dr. J. G. Lakshmi*, *Christine Trigg*, and *Harriet Perry* titled "The Effect of Ammonia Accumulation on Blue Crab Shedding Success" will help people who are in the business of holding hard blue crabs in a closed system until they shed and become soft shells. The value of soft shells generally is much higher than that of hard crabs, and to fishermen this difference is dramatic. Based on results of their tests, the recommended level of free ammonia should not be higher than 1 part per million in such systems, and a minimum of 1 gallon of seawater be provided per crab in a recirculating holding system. *Dr. Gordon Gunter* has been asked by the American Heritage Center of the University of Wyoming at Laramie to deposit his personal papers, records, and various memorabilia in that center, with whatever restrictions he cares to require on their use. This is part of a program to collect information pertaining to world exploration. Dr. Gunter has been in every bay of the Gulf of Mexico between Key West and the Laguna de Tamiahva since 1931, and has done some work in most of them. *Dr. Harold D. Howse*, director of the GCRL, announced that the J. L. Scott Marine Education Center will be opened to the public on May 1, and will feature live animals displayed in tanks simulating their natural habitats. A branch of the GCRL, the education center is located on the Laboratory's Biloxi Campus, which is on the south side of U.S. Highway 90, just west of the Biloxi-Ocean Springs bridge. The Gunter Library received a gift valued at \$2500 from *Dr. Curtis L. Newcombe*, who has retired to Ocean Springs after a career in marine science research and education. The gift contained a particularly rich collection of important papers on commercially valuable species that the library lacked, as well as valuable books that are no longer in print. Dr. Newcombe's career included faculty posts at several universities and directorships at the Virginia Fisheries Laboratory and at the Frederic Burk Foundation Center at San Francisco State College. The 1984 summer class schedule at the GCRL broadens the range of marine science for the student to select from, including a new course and the re-offering of another. Term 1: Marine Invertebrate Zoology, June 4-July 13; Oceanography I: Physical, Chemical, and Geological, June 11-July 13; Marine Microbiology, June 11-July 13; Marine Ecology, June 11-13; Coastal Vegetation, June 25-July 13; Early Life History of Marine Fishes, June 18-July 13. Term 2: Marine Vertebrate Zoology and Ichthyology, July 16-Aug. 24; Aquaculture, July 16-Aug. 24; Oceanography II: Marine Biology, July 16-Aug. 17; Fauna and Faunistic Ecology of Tidal Marshes, July 16-Aug. 10; Marine Botany, July 16-Aug. 10; Coastal Marine Geology, July 16-Aug. 3. Carcinology and Comparative Histology of Marine Organisms are offered by arrangement.

North Carolina

North Carolina State University, Horticultural Science. *Dr. C. R. Unrath*, extension and research on cultural preharvest physiology of apples, was promoted to Professor. The following faculty were promoted to Associate Professor with permanent tenure: *Dr. Paul R. Fantz*, horticultural taxonomy; *Dr. L. Eric Hinesley*, growth and developmental physiological research on Christmas trees; *Dr. Dennis J. Werner*, genetic evaluation of peach and nectarine varieties. *Dr. Aurora Baltazar*, under the direction of *Dr. T. J. Monaco*, received the 1984 Award for Excellence in Doctoral Research presented by the Southern Region of The American Society for Horticultural Science for her paper entitled "Uptake, Translocation, and Metabolism of Bentazon by two Pepper species (*Capsicum annuum* and *Capsicum chinense*)." *Dr. Douglas C. Sanders* recently conducted research in Colombia on asparagus production practices. *Dr. L. George Wilson* was an invited participant in regional workshops in Barbados on "Appropriate Postharvest Technology and Strategies for Perishable Caribbean Crops." The NCSU Flower Judging Team sponsored by the NCSU Horticulture Club, and the Iota Chapter of Pi Alpha Xi, under the direction of *Dr. Joe Love*, won 1st place for the second consecutive year in the Inter-collegiate Flower Judging Contest sponsored by the Society of American Florists and Pi Alpha Xi; team members included *Mark Young*, *Jay Coke*, *Nancy Eickhopp*, and *Cynthia Wynia*.

Wake Forest University, Department of Biology. New faculty are: *Dr. Nina Stromgren Allen*, formerly of the Department of Biology of Dartmouth College, and *Dr. William A. Thomas*, from the Department of Biology of Princeton University. *Dr. Allen* is well-known for her studies on movements of sub-cellular components and as co-developer of the equipment and procedures for video enhanced computer imaging. *Dr. Thomas* investigates the mechanisms of cellular recognition and cellular adhesion in developing tissues. The department is actively recruiting students for the Graduate Program in Cell Biology, and offers attractive scholarships, fellowships, and assistantships. Approximately \$500,000 per year in grant funds support research in cell biology. Wake Forest University hosted the 1984 Annual Meeting of the North Carolina Academy of Sciences. *Dr. Ronald V. Dimock*, Professor of Biology, was elected President-Elect of NCAS.

Tennessee

Austin Peay State University, Biology Department. The University recently entered into a lease agreement with The Nature Conservancy on Barnett Woods Natural Area, a 40-acre, mostly wooded tract in Montgomery County, Tennessee. The area will be used by the biology department for teaching field courses and ecological research. *Drs. Edward W. Chester* and *A. Floyd Scott* are serving as co-directors of the Natural Area. *Dr. William H. Ellis*, Professor of Biology, and Dean of the Graduate School, was elected President-elect of the Tennessee Academy of Sciences. *Dr. A. Floyd Scott* was elected Section Chairman of the Zoology Section, and *Dr. Edward W. Chester* was elected Secretary and Chairman-elect of the Botany Section.

University of Tennessee, Ecology Program. For the fifth consecutive year the University of Tennessee will conduct an international training course entitled, "Ecological Approaches to Natural Resource Management." This summer course is sponsored by US-AID, UNEP, FAO, and the World Bank. Most participants hold government positions in developing countries. Any international students who may be interested in attending should contact *Dr. Frank McCormick*, Ecology Program, UTK. The Biological Science Departments at UTK are participants in a \$3.5 million Center of Excellence program recently announced by the State of Tennessee. Funds are provided to assist meritorious programs and faculty to achieve their potential for excellence.

Middle Tennessee State University, Department of Biology. *Dr. Marion Wells* reports that an energy dispersive X-ray system, Tracor Northern TN 5500 with Microscan, will soon be added to their scanning electron microscope.

Uplands Field Research Laboratory, Gatlinburg. A conference on the management of biosphere reserves, sponsored by the Great Smoky Mountains National Park, will be held in Gatlinburg on November 26-29. Subject areas are: The Biosphere Reserve in Concept and Practice, The Roles of Biosphere Reserves in Developed Countries, Research Technology Department and Information Transfer, Public Education and Development of a Conservation Ethic, Resource Management and the Role of Biosphere Reserves in Integrated Development, Coordination Strategies at the Regional, Bilateral and International Levels. Principles presented will be illustrated within a series of workshops on the following management issues: air pollutants, development of nonrenewable resources, use of renewable resources, problem species, visitor activities. For further information contact: *Dr. John D. Peine*, Director, Uplands Field Research Laboratory, P.O. Box 260, Gatlinburg, Tennessee 37738.

Virginia

Virginia Polytechnic Institute and State University, Department of Biology. *Dr. Bruce Wallace*, University Distinguished Professor in Biology, has been reinstated to the prestigious National Academy of Science. Wallace, who resigned in 1972, is the first such resignee ever to be reinstated. Wallace was one of several members who resigned 12 years ago in protest of certain academy practices which have since been discarded. Dr. Wallace received his doctorate from Columbia University, and has been associated with the genetics department of the Carnegie Institution of Washington, Assistant Director of the biological laboratory of Cold Spring Harbor, N.Y., and Professor of Genetics at Cornell University. He has been with Virginia Tech since 1981.

Roanoke College, Department of Biology. *Dr. Robert E. Jenkins* and *Noel M. Burkhead* (Research Adjunct) were awarded a grant by the Virginia Commission of Game and Inland Fisheries, through a Non-game Wildlife Program, to produce a book manuscript on the freshwater fishes of Virginia. Additional funding for the project has come from the Virginia Environmental Endowment, and the Virginia Electric Power Company. The study was further supported by \$25,000 from John A. Mulheren, a Roanoke College alumnus who had put those monies in a trust fund contingent upon obtaining support outside of the College. This study of Virginia fishes has been ongoing since 1973. The manuscript is expected to be completed in August 1984.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Alabama

Anniston Museum of Natural History. Saturday, August 11, 1984, "Museum Day" will be held from 10:00 am-4:00 pm. There will be entertainment, participation events, lunch, and tours of the museum, all free to the public. Between September 15 and October 21, 1984, an exhibit entitled "20th Century Dinosaurs" will be on display. This exhibit of pre-historic animals was sculpted from discarded auto parts by Jim Gary.

Florida

The Marie Selby Botanical Gardens, Sarasota. Cytologist *Dr. Greg Brown* of Washington State University arrived on April 23, 1984 to begin new research on bromeliads. With *Harry E. Luther*, director of Selby's international Bromeliad Identification Center, he will make the first systematic attempt to count the chromosomes of each species to show the relationships among the genera, species, and varieties. Harry Luther and *Dr. Amy Jean Gilmartin* (Washington State University) are participating in an international project, sponsored by the University of Göteborg, Sweden. They are co-authoring the volume on bromeliads in the many-volumed "Flora of Ecuador" which will take several years to complete. A nine-day tour from July 20 to 28, 1984, sponsored by Selby Gardens, focuses on British Columbia's majestic Cascade Mountains and the area's wild flowers, gardens, and scenery. Cutoff date for reservations is May 15th. *John T. Atwood Jr.* (Ph.D. Florida State University), has been awarded a grant by the Committee for Research and Exploration of the National Geographic Society in support of an expedition to Borneo to study and conduct research in pollination biology of that country's Paphiopedilum orchids. Atwood, who is director of the Orchid Identification Center and the Education Program at Selby Botanical Gardens, expects to leave for Borneo in late March and return to Sarasota in May.

Mississippi

Mississippi Museum of Natural Science, Jackson. *Dr. J. B. Wiseman, Jr.*, recent graduate of Mississippi State University, has accepted a position as community ecologist. He will be conducting a statewide inventory to identify significant natural communities.

North Carolina

North Carolina State Museum of Natural History, Raleigh. *Dr. Robert Wolk*, biologist, and former Director of the Nature Science Center in Winston-Salem, and most recently a lecturer at Greensboro

College, has joined the museum staff as Administrator of the Education Section. *Dr. Barbara Beaman*, botanist, has been appointed Wake County Schools Natural History Specialist in the Education Section. *Dr. John E. Cooper* has returned from a year's leave-of-absence. His first priority is to restore the museum's regional journal, *Brimleyana*, to schedule. *William Palmer*, who replaced Dr. Cooper as Research Collections Section Administrator, has returned to his post as Chief Curator of Lower Vertebrates. Two new publications are now available from the museum: 1983 Supplement to *Atlas of North American Freshwater Fishes*, 67 pp., indexed. \$5 postpaid. *The Seaside Sparrow, its Biology and Management*, 1984. Proceedings of a 1981 symposium, it contains 18 papers and an LP record of vocalizations, as well as a color frontispiece by John Henry Dick, illustrating the 9 races of the sparrow. \$15 postpaid. Checks payable to: NCDA Museum Extension Fund.

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COVER

Whitewater Falls. One of the many spectacular waterfalls in the river gorges of the southern Blue Ridge escarpment. See the article by Dr. Ware dealing with research in these gorges supported by the Highlands Biological Station. Photograph taken in June 1984 by *Gilbert Leebrick*, Director of the Appalachian Environmental Arts Center, Highlands, NC. See the last entry under "News of Biology" in this issue.

TIME AND PLACE OF FUTURE MEETINGS

1985	April 10-13	Middle Tennessee State University, Murfreesboro
1987		University of Georgia, Athens (50th Anniversary)

PATRON MEMBERS

Carolina Biological Supply Company, Burlington, NC
Martin Instrument Company, Greenville, SC
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Mountain Memoirs: Botanizing in a Blue Ridge Gorge

Donna M. Eggers Ware

*Herbarium, Department of Biology, The College of William and Mary,
Williamsburg, Virginia 23185*

It is the policy of the Vanderbilt University biology faculty to encourage graduate students to gain experience in a lab at another university or at a field station. As a result, in 1964 I applied to Highlands Biological Station, Highlands, North Carolina, and received a grant-in-aid supported by the National Science Foundation to study the flora of Thompson River Gorge. After completing my first year of graduate school, I arrived in Highlands in early June of 1965, uncertain what to expect. As an undergraduate, I had done a floristics study of Graydon Springs, a small watershed in the Missouri Ozarks, but that was familiar territory near home, and a Camp Fire Girls camp, at that. Now the wilds of the Southern Appalachians awaited me.

First I settled into a room in one of the residential cottages at the Station and then set up lab space in the Coker Building. The next order of business was to read the literature on the other river gorges of the region and to pore over topographic maps of the Thompson (Transylvania Co., North Carolina, and Oconee County, South Carolina). Initially I was a bit disappointed that "my" river had such an ordinary name, in contrast to those of the other rivers that descend from the southern end of the Blue Ridge to the Piedmont: Chattooga, Whitewater, Horsepasture, Toxaway, Eastatoe. That regret faded as the maps revealed the wonderful nomenclature of landforms in the Thompson watershed—names like Rocky Knobs, Rainy Knobs, Long Spur Ridge, Gallbuster Mountain, Misery Mountain, and Tarkiln Gap. The romance started even before first sight.

James F. White was one of the first people I met at the Station, and his mountain wisdom and good nature greatly influenced the character of this experience for me. A lean, wiry native of the region, then perhaps in his late 30's, James was employed both as custodian of the biological station in Highlands and as manager of the research base camp in Thompson Gorge. His duties included providing transportation for gorge investigators to and from the base camp in the 4-wheel drive vehicles made available by Dr. Thelma "Doc" Howell, Executive Director of the Station. Thus, one day in mid-June, we loaded the jeep with plant presses and other necessary paraphernalia and set out for the Thompson. Our route, one that we were to traverse many times that summer, followed U.S. 64 from Highlands northeast to Cashiers, then eastward into Transylvania County. As we drove along on that initial journey, James made optimum use of the opportunity to school the neophyte on the subject of rattlesnakes. Doc Howell had forewarned me of the inclination of copperheads to feed in the shallows of stream margins and of rattlers to climb rhododendron trunks; now James held forth on other venomous scenarios. He reminisced about the big rattler seen the previous year near camp, a specimen so long it stretched all the way across the logging road! He recalled another time when an unfortunate person walking last in a long line of hikers received a "peck on the ankle" from a frustrated rattler lying in the

trailside vegetation. Perhaps the most calculated element of his repertoire that day was the saga of a fluffy white dog whose woodland outing was fatally forest-shortened by a rattler coiled behind a tree in its path. This steeping in the potentialities may have made me wary enough to avoid the riskier situations, but I never did see a rattlesnake on the Thompson.

After passing Sapphire Lake, just east of the headwaters of Bearwallow Creek, the route to Thompson Gorge left the main highway and followed Bohaynee Road southward. At the Wallace Brewer homeplace, about halfway between the Horsepasture River and Bohaynee, we began to descend into the watershed of the Thompson—a slow, rough ride on a rocky logging road maintained by James and Duke Power Company. Finally, we reached the green canvas kingdom that had been erected on the west bank of the Thompson where the river swings abruptly southward from its initial easterly flow and undertakes a more radical gradient toward the Piedmont. Here the river passes between “Revis Ridge” on the east, where James later showed me the vegetation-shrouded ruins of the Revis family cemetery, and “Camp Mountain” on the west. The campsite was at one of few spots where the riverbank was broad enough and flat enough to accommodate it. There were four tents, a canvas-covered kitchen and dining area, and a latrine. Three of the tents were large enough to house several people, but because I was the only woman investigator, I was given the smaller umbrella-style tent. James’ wife, Mary, who was the camp cook, and their three boisterous young sons greeted us when we arrived. Also in long term residence, Tom Mowbray, a graduate student of H. J. Oosting at Duke, was comparing the forest vegetation of north-facing and south-facing slopes on Long Spur Creek, a nearby tributary to the Thompson. Over the summer there were never more than ten or twelve people at the camp at one time, counting the five members of the White family.

My first stint in the gorge lasted eight days. Most of that time was spent exploring areas I could reach from the base camp on foot, but sometimes James and I took the jeep to areas further down the gorge or higher in the watershed near the Rocky Knobs. I was awed by his ability to dance the jeep over mere vestiges of roads and through wash-outs, often at seemingly near-vertical angles. He approached this field work not with a dutiful attitude, but with an enthusiastic sense of participation, and my study benefited in many ways from his intimate knowledge of the area and his keen observations. Although without much formal education, James had a wealth of information to share; not only grassroots lore, but also assorted botanical nuggets about the likes of *Pachysandra procumbens*, *Buckleya*, and the filmy ferns that he had absorbed during his association with other studies done at the station. I remember, too, his patience and his bent for teasing. One day I inadvertently provided fuel for the latter when, in response to the sound of a ruckus a distance away in the woods, he announced, “There’s grouse!” and misunderstanding, I inquired, “Ralph who?” To be sure, that was not the last heard about “Ralph” that summer!

From those first days in the gorge there remain vivid, specific mental images of plant communities and individual species that I had never seen before, as well as of familiar plants observed in new settings and new juxtapositions. Among the gifts of those early summer days were tangled masses of climbing fern (*Lygodium palmatum*), splended yellow spires of loosestrife (*Lysimachia fraseri*) and *Thermopsis fraxinifolia*, strange-looking fruits of buffalo nut, and silvery undersides of hydrangea (ssp. *radiata*) shimmering in the breezes. My eye was also arrested

by the thick and shiny, ground-hugging leaves of *Viola rotundifolia* because they were so unlike those of any violet I had ever seen in the Ozarks; and by the leaves of the rare shrub *Fothergilla major* because they were so strikingly similar to those of its familiar cousin, witch-hazel. Another highlight of that week was when I spotted a cucumber magnolia in a cove on "Camp Mountain," an occasion that inspired James to exercise his shinnying skills in quest of fruit-bearing voucher specimens from the canopy. That was the only cucumber tree we ever saw on the Thompson.

Most of the Thompson River watershed was owned by a subsidiary of Duke Power Company, and had been logged in recent years. For the most part, the forest was rather young second growth, but James knew of enclaves that had long escaped the saw. A stand of oak-hickory forest in a south-facing cove below the Rocky Knobs and a stand of chestnut oak and northern red oak in an east-facing cove on Long Spur Ridge were good examples. Due to disturbance by previous logging, white pine was a common associate of the chestnut oak-dominated east- and west-facing upper slopes of the gorge below the base camp. Other trees commonly encountered on these slopes were sourwood, red maple, black gum, and tulip poplar. Occasional root sprouts of the once-dominant American chestnut gave testimony to what-might-have-been except for the advent of the chestnut blight in the 1930's. Lower on the slopes, sweet birch, hemlock, and Fraser's magnolia occurred frequently, and the river banks were lined with thickets of alder and rhododendron and knee-high stands of yellow-root. At the other extreme were dry, sparsely vegetated rock-faces high on the mountainsides where Michaux's saxifrage and twisted-hair selaginella grew. The big, thick cushions of selaginella invited one to sit down and break out the brown bag lunch. James warned me, though, *first* to check for a yellow jacket's nest in the selected cushion. I learned only through piercing experience, however, that the accumulated leaf litter at the base of a rock outcrop is another favored nesting site for yellow jackets. That revelation inspired another: the value of applying the suction cup from a snake-bite kit to relieve the pain of wasp and bee stings.

After a typical day in the field everyone returned to camp for supper together. My first priority after supper was to press that day's voucher specimens. Then, weather permitting, I would sit on the riverbank and write a letter or study French in preparation for the language exam awaiting me back at Vanderbilt. Afterward, there was time simply to sit there, absorbed by the roar of the river and the dusk-glow of the verdant mountain slopes. The many rainy days and nights which produced that verdancy, well over 100 inches some years, posed a problem to my study, however. The plant presses, which were sheltered in a tent each night, needed to dry in the sunshine during the day. A concern was that the persistent high humidity would cause the specimens to mold before they could be transported to the driers at the Biological Station. Fortunately, that never happened.

From its headwaters in Jackson Co., North Carolina, to its confluence with the Whitewater River near Jocassee, South Carolina, the Thompson ran a course of nearly ten miles and descended 3000 ft. At the first of two spectacular cascading waterfalls, about a mile north of the South Carolina line, the steep, wooded slopes give way to vertical rock walls, forming a deep, narrow gorge in which the river drops from roughly 2200 ft to 1800 ft in about a quarter mile. Here the orientation of the slopes above the gorge-proper changes from east- and west-facing to a southerly exposure, with a corresponding change in the flora. These slopes are

mostly too dry for white pine, and pitch pine, shortleaf pine, and Virginia pine occur instead. As we explored this area we were surprised to chance upon a thriving colony of grass-of-Parnassus (*Parnassia grandifolia*). The combination of a seep-spring, a shaded flatrock, and a northeast exposure afforded by a spur ridge provided appropriate habitat for this species in the midst of a generally unsuitable situation. Progressing downslope toward the wall of the gorge along one of the dry, piney spurs near the upper cascade, we were rewarded with a new locality for *Fothergilla major*. As we worked our way further north along the precipice above the cataract, our path was blocked by an algae-coated band of rock where another seep-spring flowed out of the slope above and down the wall of the gorge. James' long legs negotiated it effortlessly, but by my 5'3" standards, it took a long, stretching step to span this slick rock. The alternative was to slip on the algae and disappear into the chasm below. Later that night as I lay in my sleeping bag reassessing the "what if" of the situation, I wished that I had taken another route. Although my desire was to give myself fully to this study, a plunge to death was not what I had in mind.

Along the river below the first cascades several tree species restricted to the lower gorge were first encountered: red mulberry, white walnut, American beech, sweetgum, and pawpaw. Further south, beyond the region of southerly exposure, they were no longer limited to areas near the river, but also grew on the flanks of Whitewater and Gallbuster Mountains. In this part of the river's course, largely in South Carolina, these trees, along with several species that also grew at higher elevations, formed a highly mixed forest type. Another contrast between the upper and lower portions of the gorge was the occurrence of floodplain forests, usually very disturbed by logging, at the lower elevations. In a stand of Canada hemlocks on a narrow floodplain just north of the mouth of Coley Creek I was attracted to a spleenwort growing on a boulder. It proved to be the rare tropical fern, *Asplenium monanthes*.

The summer was a mosaic of periods in the gorge and periods at the Station identifying specimens and writing. In all, there were twenty-seven field days, including several day trips from Highlands when we entered the gorge from its southern end through Jocassee. Some of those trips were made with Gibbes Patton of Wofford College, another botanist from the Station also doing field work in the area. After completing the report I headed back to Nashville in mid-August fully intending to engineer an opportunity to return. I planned to expand the coverage to include the entire upper watershed of the Thompson and the spring and fall floras. Furthermore, I wanted to convince my graduate committee to allow me to develop the study into a floristic Master's thesis. That proved to be an unrealized hope, and I soon was launched into dissertation work on a revision of North American *Valerianella*. The Thompson Gorge study went on "hold," latent but by no means forgotten.

Five years later, having completed my graduate work, married the recipient of those riverbank letters, and taken a position as curator of the herbarium of the College of William and Mary, I applied to Highlands Biological Station for support to finish the study. Another station grant-in-aid, supported by NSF, allowed me two weeks in the field each season (May, July, September). When I returned to Highlands, James was still there and we resumed our teamwork in the field. There was a heart-breaking difference this time, though. James had terminal lung cancer, and it had already taken a noticeable toll on his stamina. Nevertheless, he was

not to be deterred from field work on the Thompson. There was no base camp this time, so all the forays were day trips from the Station. These ventures led us to many new places: the uppermost reaches of the watershed, the rock outcrops on top of Sassafras Mountain (4280 ft) where Carolina hemlock, black chokeberry, Catawba rhododendron, and table mountain pine grew; the floodplain of Gumbottom (Grimshawe) Creek carpeted with painted trillium and dog-tooth violet (*Erythronium americanum*); a cove on Hogback Mountain harboring huge old hemlocks, basswoods, and tulip poplars and beneath them, a stand of umbrella-leaf (*Diphyllia cymosa*); and the uppermost waterfall on the Thompson, a 120 ft plummet from the escarpment shelf at an elevation of about 3000 ft, where stands of turtlehead (*Chelone glabra*) and tassel rue (*Trautvetteria carolinensis*) flourished in the spray and maidenhair spleenwort awaited in a rock crevice.

The first return visit into the lower part of the gorge was a nightmare. The slopes of Hester, Whitewater, Musterground, and Gallbuster mountains had been stripped of their forests in preparation for the filling of Lake Jocassee. The Thompson was still winding its way to its confluence with the Whitewater River, but now it was murky with sediment from the deforested slopes. Instead of trees, the mountain slopes were now inhabited by a dwarf wilderness of weeds, many of which were new to the flora of the Thompson watershed since there had been so little open habitat available previously. James managed to drive the jeep out of the devastated area, the incipient lake-bed, and onto a negotiable logging road through ragged, heavily timbered forests on a southeast-facing incline above Wright Creek, a major tributary. At an elevation of about 1450 ft we found ourselves in a partially logged cove of hemlock, tulip poplar, and sweet birch that, by relative contrast, invited us to stop and explore more closely. On steep, shady banks near the creek were ginseng, *Trillium discolor*, perfoliate bellwort, foamflower, and wild ginger (*Hexastylis minor*), as well as numerous sedges in the seeps. As I skirted the margin of a large rhododendron brake just upslope from the stream, I gazed with amazement upon a colony of the endemic Oconee bells! My only previous opportunity to see this rare and exquisite plant had been in the flower box in front of Coker Hall at the Station. Finding Oconee bells thriving in the midst of a logging operation and barely beyond the reaches of wholesale deforestation nurtured my hope that the escarpment gorges would not be ruined by the assaults of development, and would continue to provide a habitat for the diverse biota of the region.

In intervening years I have botanized in the llanos of Venezuela, in interior Alaska, and various habitats in between, but none of those experiences have supplanted the indelible impressions of those days spent in the Blue Ridge roaming the watershed of that extraordinary river with the ordinary name. I plan to return to the Thompson, and when I do I'll try to relocate that symbolic colony of Oconee bells. I wish James White could join in the search.

EDITOR'S NOTE. For additional information regarding research in the river gorges mentioned here or the Highlands Biological Station, write the Director, Highlands Biological Station, P.O. Drawer 580, Highlands, NC 28741 and see the following references:

- Cooper, A. W. & J. W. Hardin. 1971. Floristics and Vegetation of the Gorges on the Southern Blue Ridge Escarpment. In P. C. Holt (ed.), "The Distributional History of the Biota of the Southern Appalachians. Part II. Flora." Res. Div. Monogr. 2. VPI & SU, Blacksburg, VA.
- Sargent, R. M. 1977. Biology in the Blue Ridge. The Highlands Biological Foundation, Inc. Highlands, NC.
- Ware, Donna M. Eggers. 1973. Floristic Survey of Thompson River Watershed. Castanea 38: 349-378.

Association Affairs

PLEASE, AS MEMBERS

- Check the “Call-for-Papers” for all deadlines related to the 1985 meeting
- Send in nominations for officers
- Nominate outstanding teachers for the annual award
- Submit a paper for one of the research awards
- Encourage your students and colleagues to join the ASB
- Encourage your school library to subscribe to the ASB Bulletin
- Send in manuscripts and book reviews for publication in the ASB Bulletin
- Note the 1985 billing envelope mailed with the Call-for-Papers and send in your dues while you think about it—now!

COPY DEADLINES

January issue: September 25

April issue: November 25

July issue: April 25

October issue: June 25

FORTY-SIXTH ANNUAL MEETING MIDDLE TENNESSEE STATE UNIVERSITY MURFREESBORO, TENNESSEE APRIL 10-13, 1985

PLAN NOW TO ATTEND!

1. See “Call-for-Papers” for various deadlines. Title and abstract due November 1.
2. A ***pre-registration*** form will be in the January issue. Pre-registration will be advantageous in obtaining tickets for special meals and events, eliminating long lines at registration, and in helping the Local Arrangements Committee with plans. Pre-registration will be at a substantial price discount.
3. ***Lodging.*** The Ramada Inn, located approximately three miles from campus, will serve as guest hotel and a block of 70 rooms has been reserved with a special convention rate available for all rooms. Details of other area motels and their rates will be given in the January issue.
4. ***Parking.*** On-campus parking is limited and a conference parking permit will be furnished with pre-registration and registration materials.

Book Reviews

Stearn, W. T. 1983. **Botanical Latin.** Third ed., revised. David & Charles, Inc., North Pomfret, VT 05053. \$32.00. 566 pp., illustrated, hardcover.

Ten years after the second edition, this is a slight revision of the standard comprehensive guide to the history, grammar, syntax, terminology, and vocabulary of the Latin used by botanists. It is a unique and remarkable work which is an invaluable reference source for those using and teaching botanical terminology and nomenclature. As E. J. H. Corner stated in 1960: "We botanists keep Latin alive. We read it, write it, type it, speak it when mother tongues fail, and succeed in putting such remarkable things as orchid-flowers and microscopic fungi into universal understanding through Latin." If indeed it is alive, then Stearn's editions keep reminding us how to live with it. (*Ed.*)

County Map Books. County Maps, Puetz Place, Lyndon Station, WI 53944. \$10.70, paper.

Field biologists generally rely on county road maps for exploring new areas or obtaining precise locations for collecting sites. One is frequently faced with the possibility of somehow handling, in the car or on a roadside, one or more rolls of individual county maps, or possibly a box of folded sheets, or an equally unmanageable, huge, bound volume (*e.g.*, 19 × 33" and too flexible, for the 100-plus maps for NC). Imagine the difficulty in KY with 120 counties, GA with 158, or TX with 254! Now the job is made much easier with a very nicely bound set of county maps, in a quite manageable 11 × 16" size, researched, compiled, and designed by C. J. Puetz. These maps are essentially like the official state maps with all road numbers, mileage, rivers, major creeks and mountains, elevations, cities, and towns named. In addition, there are notes of historical and geographical interest. One may need a magnifying glass, or possibly bifocals for the faculty, to read some of the road numbers. Thus far these County Map Books are available for ten states: FL, IN, KY, MI, NC, OH, PA, SC, TN, and WI. These are ideal for the Herbarium, Museum, and that box of collecting materials. (*Ed.*)

News of Biology in the Southeast

Jon R. Fortman—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

University of Alabama, Department of Biology. Two new faculty have joined the department: *Dr. Arthur C. Benke*, Professor of Biology, and *Dr. Mark Brennan*, Assistant Professor. Dr. Benke joins the Ecology and Systematics Section and the Aquatic Biology Program. Most recently, he was an Associate Professor at Georgia Tech. His research interests are in aquatic ecology. Dr. Brennan just completed a Post-Doc with W. J. Dickinson at the University of Utah after receiving his Ph.D. from Indiana University. His research interests are in molecular biology. *Dr. Ronald Lindahl* has been promoted to Professor of Biology and Biochemistry.

Tuskegee Institute, Department of Biology. *Dr. James H. M. Henderson*, Chairman of the Division of Natural Sciences, is the Director of a 3 year grant from NIH, Minority Biomedical Research Support Program, which will provide funding for both undergraduate and graduate students interested in research positions. Other grants have been received by *Dr. Walter Hill* and *Dr. P. K. Biswas*, both of the Department of Agricultural Science. *Dr. Evelyn White*, Assistant Professor of Biology, is director of a program, funded by the U.S.D.A., to teach basic science skills to a group of workers employed in the food industry. *Dr. Julian Thomas*, Professor of Biology, is the Director of a program for student training in recombinant DNA technology, cytogenetic technology, and electron microscopy. Funds for this program were provided by the Department of Education. *Dr. Linda Washington*, Professor of Biology, has been named as Associate Director of the Carver Research Foundation. *Dr. Walter Hill* and *Dr. Linda Washington* have each received a Distinguished Scientist Award from the United Negro College Fund.

Georgia

Georgia College, Department of Biological and Environmental Science. *Dr. Robert Thomsen* (Ph.D. Miami University of Ohio) will join the Biology Department in the area of physiology.

Mississippi

Delta State University, Department of Biological Sciences. *John Tiftickjian*, a recent graduate of Washington State University, has joined the department following the retirement of *Mabel Raspet*. Dr. Tiftickjian is a botanist with special interest in the influence of environmental factors on sexual reproduction of desmids.

Gulf Coast Research Laboratory, Ocean Springs. The GCRL is sponsoring ten Year-of-the-Ocean seminars, which will be held at the new J. L. Scott Marine Education Center in Biloxi from June 1984 through October. *Dr. Gene A. Bramlett* of Auburn University has been elected Chairman of the Board of Directors for the Mississippi-Alabama Sea Grant Consortium for the 1985 fiscal year. Other officers for 1985 are *Dr. Harold Howse*, Director of GCRL, vice-chairman; and *Dr. Robert T. van Aller*, Dean of the Graduate School, University of Southern Mississippi, secretary. The new J. L. Scott Marine Education Center will be dedicated at 4:00 pm on June 20, 1984, in a public program in the Center auditorium. The Mississippi-Alabama Sea Grant Consortium has awarded "Year of the Ocean" fellowships to three graduate students involved in marine studies at member institutions. Recipients are *John F. Valentine*, University of Alabama; *Dana L. West*, Auburn University; and *Sarah E. McCaleb*, University of Southern Mississippi.

North Carolina

Duke Power Co. Environmental Services, Huntersville. The 1983 annual meeting of the Carolinas Area Benthological Workshops (CABW) was hosted by Carolina Power and Light. About 45 researchers and students participated, including a number of new faces, from NC, SC, GA, VA, AL, and TN. *Dr. John Morse*, Clemson University, summarized events at the Fourth International Trichoptera Symposium held last July. The 1984 CABW meeting will be the tenth anniversary, and will be hosted by the Georgia Power Company in Atlanta. For additional information regarding the meeting, which will probably be held in early November, 1984, contact: George Guill, Georgia Power Company, Environmental Affairs Center, 791 Dekalb Industrial Way, Decatur, GA 30033. (404) 526-2675.

Virginia

Old Dominion University, Department of Biological Sciences. The Ecological Sciences Ph.D. Program has several special doctoral research assistantships available for the Fall semester, 1985. These R.A.'s carry a stipend of \$7000 per academic year, renewable for three years. Recipients who have a Masters degree and register for 9 hours each semester will also receive a tuition waiver. Applications and requests for additional information should be sent to: Dr. Frank P. Day, Jr., Director, Ecological Sciences Program, Dept. of Biol. Sciences, Old Dominion Univ., Norfolk, VA 23508.

West Virginia

West Virginia University, Morgantown. *The Earl L. Core Botanical Slide Collection* of the Herbarium consists of over 21,000 color slides. Most of these are of botanical or ecological subjects. Appalachian and Arctic subjects are especially well represented. Duplicates are available. For additional information, contact: Dr. Roy B. Clarkson, WVU Herbarium, P.O. Box 6057, Morgantown, WV 26506-6054.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

The Marie Selby Botanical Gardens, Sarasota. *Dr. Alec M. Pridgeon*, new Editor of the American Orchid Society Bulletin, and *Dr. William D. Stern*, Chairman of the Department of Botany, University of Florida, spent a weekend in May at Selby Gardens. The purpose of their visit was to obtain orchid specimens for a continuation of their joint research on morphological and anatomical studies of orchids. *General George G. Loving*, Executive Director of the botanical gardens, has appointed *W. John Kress*, Ph.D., to the position of Director of Research. Currently a research scientist in the Department of Botany at Duke University, Dr. Kress will assume his new post in January 1985. He will replace *Dr. Calaway Dodson*, a founder of Selby Botanical Gardens, who left last winter to concentrate on South American orchid research in connection with the Missouri Botanical Garden. Dr. Kress earned his doctorate in botany from Duke in 1981 after earning his B.A. in biology from Harvard in 1975. He is a native of Alton, Illinois. He has made extensive research expeditions to New Zealand, Australia, Fiji, the Solomon Islands, Papua New Guinea, Samoa, South and Central America, and Jamaica.

ABOUT BIOLOGICAL STATIONS

North Carolina

Highlands Biological Station. The Appalachian Environmental Arts Center is a relatively new facility and program of the Biological Station. It was established in 1983 for the promotion of a visual and verbal dialoguc between the arts, sciences, and humanities concerning the natural environments of the southern Appalachians. *Mr. Gilbert Leebrick* has recently been named as Director of the Center. He has been Director of the North Carolina Center for Creative Photography in Durham, NC, and on the faculty of North Carolina Central University for the past two years. Previously he was Executive Director of the Image Foundation and on the Faculty of the University of Hawaii. His photographs have been exhibited nationally and his work resides in numerous personal and institutional collections. Mr. Leebrick said, "This Environmental Arts Center is a new and exciting concept which will hopefully extend the boundaries of academic disciplines and create new perspectives concerning the joys and problems facing our natural environment." The Arts Center's summer program includes photography workshops with nationally recognized photographic artists, week-long photography courses in black-and-white and color, and evening slide lectures by artists visiting the Center. For additional information, write: The Highlands Biological Station, P.O. Drawer 580, Highlands, NC 28741.

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. R. L. Beckmann, Dept. of Botany, N.C. State Univ., Raleigh, NC 27695-7612.

Name in full _____ Date _____

Title _____ Department _____

Institution _____

City _____ State _____ Zip _____

Degrees (institutions and dates) _____

Recommended by member _____

Annual Dues: _____ Graduate student \$5.00 _____ Regular \$10.00
 _____ Contributing \$12.00 _____ Sustaining \$25.00
 _____ Family \$12.00 _____ Library subscription \$12.00

The ASB

59.06

BULLETIN

Volume 32, Number 1

January 1985



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A. M. N. H.

Poisonous Plants

*The Official Quarterly Publication of
The Association of Southeastern Biologists*

ASB BULLETIN

(ISSN 0001-2386)

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Lawrence, Kansas in January, April, July, and October. Letters and other contributions, as well as all communications about editorial matters should be addressed to Dr. James W. Hardin, Department of Botany, North Carolina State University, Raleigh, NC 27695-7612. News items should be sent to the News Editor, Dr. Jon Fortman, Department of Biological Sciences, Mississippi University for Women, Columbus, MS 39701. Inquiries about missing numbers and other circulation matters should be addressed to Ms. Dorothy Hubbard, Circulation Manager, 2215 Hillthorpe Ave., Roslyn, PA 19001. Subscription orders from institutions should be sent to the Business Manager, Dr. R. L. Beckmann, Department of Botany, N.C. State University, Raleigh, NC 27695-7612. Subscription rate for non-members of the ASB: \$12.00 per year. Printing and typography by Allen Press, Inc., Lawrence, KS.

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JAMES W. HARDIN

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Lafayette Frederick, Botany, Howard University, Washington, DC 20059

Volume 32, Number 1 - January 1985

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COVER

This drawing of Baneberry, *Actaea pachypoda*, is one of 62 prepared by **Mrs. Linda Funk**. The illustrations, along with common and scientific names and information on habitat, distribution, and toxic principles, are on 4 × 6 inch "Metalphoto" aluminum plant labels used for the "Natural Garden of Poisonous Plants" at the School of Veterinary Medicine, North Carolina State University, Raleigh. This recently established garden is unique in having the species placed in approximately their natural habitat around a small pond. The garden is a joint effort between the School of Veterinary Medicine and the School of Agriculture and Life Sciences and established with the aid of a small grant from the Merck Company Foundation. It will serve to promote interest in and disseminate information regarding poisonous plants of North Carolina.

TIME AND PLACE OF FUTURE MEETINGS

1985 April 10-13 Middle Tennessee State University,
Murfreesboro
1987 University of Georgia, Athens (50th
Anniversary)

PATRON MEMBERS

Carolina Biological Supply Company, Burlington, NC
Martin Instrument Company, Greenville, SC
Beckman Instruments, Incorporated, Norcross, GA



About the Murfreesboro Meeting

Middle Tennessee State University will host the 46th Annual Meeting of the Association of Southeastern Biologists on April 10–13, 1985. Registration, paper sessions, exhibits, placement services, and the general session will be in the Keathley University Center. A tour of the Jack Daniel Distillery and a picnic at Cumberland Springs are featured late Thursday afternoon and evening, and the banquet will be on Friday evening in the Tennessee Room, James Union Building, MTSU.

SOCIETIES MEETING WITH ASB IN MURFREESBORO

Beta Beta Beta, Southeastern Region
Botanical Society of America, Southeastern Section
Ecological Society of America, Southeastern Chapter
Southern Appalachian Botanical Club

MURFREESBORO AND MIDDLE TENNESSEE STATE UNIVERSITY

Murfreesboro, a city of about 34,000, is located at the geographic center of Tennessee. Formerly the state capital, Murfreesboro has several historic sites and lies in the heart of walking horse country. It is easily reached by I-24, US 41, and US 231.

MTSU enrolls over 11,000 on a 500-acre campus, comprises 29 departments in five schools, and offers a variety of undergraduate and graduate degrees. The Department of Biology has 19 full-time faculty and 16 graduate teaching assistants. The Department is housed in Davis Science Building and Wiser-Patten Science Hall. A schedule of departmental tours will be available at registration.

PRE-REGISTRATION AND REGISTRATION

A PRE-REGISTRATION form is provided with this copy of the bulletin. Pre-registration will better enable us to provide services and facilities that you expect at the ASB Annual Meeting. Pre-registration packets and late registration will be in the lobby of the Ramada Inn (I-24 at US 231) on Wednesday from 5–9 P.M. and on Thursday 8 A.M.–5 P.M. in the lobby of the second floor of the Keathley University Center, MTSU. Please note that PRE-REGISTRATION costs less and at registration, a limited number of tickets will be available for breakfasts, luncheons, the banquet, and field trips. Tickets are needed for all breakfasts, luncheons, banquets or field trips. Use the pre-registration form for requests.

Please bring your **ASB Bulletin** (April 1985) to the meeting. Free copies will be unavailable at MTSU.

TRAVEL TO MURFREESBORO AND MIDDLE TENNESSEE STATE UNIVERSITY

Automobile—Murfreesboro is located off Interstate 24, 30 miles southeast of Nashville. Nashville may be reached by I-65 north and south or I-40 east and west. Markers direct visitors to the university from either of two interstate exits. Consult the maps to be published in the April 1985 **ASB Bulletin** for details.

Bus Service—Murfreesboro is served by the Greyhound and Trailways Bus Lines. The bus station is located approximately two miles from the MTSU campus and only a short distance from motels. Taxi service is available at the bus station.

Air Service—Several major airlines serve the middle Tennessee area. The Nashville airport is located approximately 30 miles from the MTSU campus. Shuttle service will be provided on a limited basis to ASB members arriving Wednesday afternoon or Thursday morning and departing Friday afternoon or Saturday morning if requested. Please contact: Dr. Charles R. McGhee, Department of Biology, Middle Tennessee State University, Murfreesboro, Tennessee 37132 (Phone: 615-898-2300, ext. 2057) for arrangements and details. Car rentals are available at the airport.

Local Shuttle—A shuttle service will be provided for ASB members between the Ramada Inn and Holiday Inn motels and campus. The shuttle schedule is: Thursday, April 11, 7–9 A.M. and 3–5 P.M.; Friday, April 12, 7–9 A.M. and 4–6 P.M. A van will pick up and deliver members approximately every 30 minutes during the scheduled period.

ACCOMMODATIONS

Middle Tennessee State University will not have conference housing available for this meeting; however, there are numerous motels in Murfreesboro with a wide range of prices for occupancy. The University has made arrangements with **Ramada Inn** to hold a block of rooms at “special rates” for ASB participants until one month prior to the April 10–13, 1985 meeting dates. ***Reservations should be made directly with all motels and those reserving space should be sure to indicate they are ASB participants to receive special rates.***

Motels: (The following motels are located on US 231, Exit 81, off I-24, except the Holiday Inn, which is located at Exit 78, off I-24. All motels are approximately 3 miles from the MTSU campus.)

— Ramada Inn (Meeting Headquarters) (615) 896-5080	81 rooms Single \$27, Double \$34
— Best Western Wayside Inn (615) 896-2320	103 rooms \$27–\$30/person
— Day’s Inn (615) 893-1090	120 rooms Single \$19.88, Double \$23.88
— Holiday Inn (615) 896-2420	108 rooms Single \$45, Double \$49

—Howard Johnson's (615) 896-5522	80 rooms Single \$26, Double \$32
—Quality Inn (615) 896-5450	50 rooms 1–2 persons \$32, \$5 ea. additional
—Safari Lodge (615) 896-5446	32 rooms Double \$28.50
—Travel Inn (615) 896-3210	100 rooms Single (2 persons) \$29; Double (2 persons) \$31

CAMPING FACILITIES

Cedars of Lebanon State Park—US 231 South (615) 444-9394. Exit 239 off I-40, approximately six miles from Interstate. Cost: \$7.00 plus tax for two people for night; full hook-up. Tent camping costs \$5.00 plus tax for two people per night. Fifty cents per night for each additional person.

Safari Campgrounds—Exit 70 off Interstate 24 (615) 459-6663. Cost: \$11.55 for four people per night with full hookup (\$10.40 with electricity and water only). Tent camping costs \$7.00 per night.

GENERAL SCHEDULE

Wednesday

Registration: 5:00–9:00 P.M., Ramada Inn.

Social Mixer with cash bar: 6:00–11:00 P.M., Ramada Inn.

Executive Committee meeting: 7:00 P.M., Ramada Inn.

Special Symposium: *Plant Genetic Engineering—update and teaching of undergraduates*. Presented by *Dr. Michael Torres*, North Carolina State University and St. Andrews College. Sponsored by the Southeastern Section, Botanical Society of America. 7:30–9:30 P.M., Davis Science Building, Room 100.

Thursday

Registration: 8:00 A.M.–5:00 P.M., Keathley University Center, second floor.

Past-President's Breakfast: 8:00 A.M., James Union Building.

Paper sessions, placement service: Keathley University Center.

Music City Tour (Nashville) for Guests and Members: Morning.

General Plenary Session: 11:15 A.M.–12:30 P.M., Keathley University Center.

Exhibits: Third floor, Keathley University Center.

Business meetings and luncheons of Affiliate Societies: James Union Building.

Tour of Jack Daniel Distillery and Picnic: late afternoon and evening; see pre-registration form.

Friday

Society and group breakfasts, business meetings: 7:00–9:00 A.M., James Union Building.

Paper sessions, placement service: Keathley University Center.

ASB Business Meeting: 11:15 A.M.–12:15 P.M., Keathley University Center.

Exhibits: Keathley University Center.

Business meetings and luncheons of Affiliate Societies: James Union Building.

ASB Banquet: 7:00 P.M., Tennessee Room, James Union Building.

Saturday

Executive Committee Meeting: 8:00 A.M., Ramada Inn.

Field Trips: Begin at 8:00, 8:30, 9:00, and 10:30 A.M. Departures from parking lot of Ramada Inn.

POINTS OF INTEREST IN THE MURFREESBORO AREA

Oaklands Mansion—Completely restored antebellum home; includes medical museum; located at end of North Maney Avenue in Murfreesboro; Tuesday through Saturday, 10:00 A.M.–4:30 P.M.; adults \$2, children \$1.

Rutherford County Courthouse—Constructed in 1859 and one of six antebellum courthouses still being used in the state; in the heart of Murfreesboro. Free.

Sam Davis Home—Plantation home of the “Boy Hero of the Confederacy”; located in Smyrna, 8 miles northwest of Murfreesboro; Monday through Saturday, 9:00 A.M.–5:00 P.M.; adults \$2, children \$1.

Stone’s River National Battlefield—Site of a major battle of The War Between the States; located 3 miles northwest of Murfreesboro on US 41; open daily from 8:00 A.M.–5:00 P.M. Free.

Information on additional points of interest will be included in the registration packet.

FIELD TRIPS

1. ***Savage Gulf Wilderness Area*** (8:00 A.M.–4:30 P.M.): Represents one of the finest mixed virgin mesophytic forests in the eastern United States. **Hike 1**—A four-hour, mildly strenuous hike for those desiring an overlook of the Gulf; **Hike 2**—A four- to five-hour hike into the virgin wilderness areas of the Gulf. *This is wilderness*—bring appropriate dress and footwear. \$7.00/person (includes transportation and a sack lunch). A limited number of spaces are available.
2. ***Stone's River National Battlefield*** (8:30 A.M.–10:30 A.M.; 10:30 A.M.–12:30 P.M.) \$2.00/person. Each tour will be limited to 10 participants.
3. ***Middle Tennessee Cedar Glades*** (9:00 A.M.–12 noon): Cedar glades, with a unique vegetation type, are found principally in the Central Basin of Tennessee. Thin soil over limestone results in a characteristic flora which includes several endemic spring-flowering species. \$3.00/person. Transportation provided. No difficult climbing or rugged terrain involved.

LOCAL ARRANGEMENTS COMMITTEE

(All telephone numbers are extensions of 615/898-2300)

Chairman:	George G. Murphy	2292
Program:	Mary C. Dunn	2060
Pre-Registration and Registration:	Philip M. Mathis	2061
Audio-Visual:	Ralph E. Sharp	2058
Exhibits and Exhibitors:	Marion R. Wells	2063
Field Trips:	Patrick J. Doyle	2069
Social Activities:	Wayne Rosing	2040
Transportation and Parking:	Charles R. McGhee	2057

ASB PRE-REGISTRATION FOR MURFREESBORO MEETING

(Type or print; one form for each registrant)
(Duplicate as needed)

NAME _____

DEPT. _____ SCHOOL _____

CITY _____ STATE _____ ZIP CODE _____

PLACE A CHECK MARK IN THE APPROPRIATE BLANKS.

PRE-REGISTRATION

Regular \$10.00 _____ Student \$6.00 _____

(Registration at the meeting will be: Regular \$12.00; Student \$8.00)

MEALS

ASB BANQUET

Regular \$10.00 _____

Student \$ 8.00 _____

Jack Daniel Distillery Tour

and picnic (Thursday afternoon

and evening) \$10.00 _____

BETA BETA BETA

Luncheon \$ 5.00 _____

SE Chapter, Ecological

Society of America

Luncheon \$ 6.00 _____

Southern Appalachian

Botanical Club/SE Section

Botanical Society of America

Breakfast \$ 5.00 _____

FIELD TRIPS AND TOUR

Savage Gulf

(8 A.M.-4:30 P.M.) \$ 7.00 _____

Stone's River Battlefield

(8 A.M.-12:30 P.M.) \$ 2.00 _____

Cedar Glades

(9 A.M.-12 Noon) . \$ 3.00 _____

Music City Tour

(Nashville) 4½ hours

Thursday morning . \$16.50 _____

EXTRA ASB BULLETINS

\$3.00 per copy at registration for the April 1985 issue; members and non-members.

Make check for total amount payable to ASB Local Committee.

Send a completed copy of this form and your check by *April 1st* to: ASB Pre-registration, Box 60, Department of Biology, Middle Tennessee State University, Murfreesboro, TN 37132.

Association Affairs

The Executive Committee, on April 14, 1984, recommended a revision of the ASB Constitution & By-Laws. The last published version was in the ASB Bulletin 20: 110-115. 1973. The revisions below are recommended by the Executive Committee and will be voted on by the membership at the next annual ASB business meeting, scheduled for April 12, 1985. Portions to be deleted are printed in *italics*; new wording is in **bold face**.

CONSTITUTION AND BY-LAWS OF THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

ARTICLE I. Name

The organization shall be known as the Association of Southeastern Biologists.

ARTICLE II. Objectives

The objectives of the Association shall be to encourage in the broadest and most liberal manner the advancement of Biology as a science by the promotion of research in Biology; by the increase and diffusion of knowledge of Biology; by emphasis *of on* the relation of fundamental knowledge of biology to the solution of biological problems; by the preservation of biological resources; and by *its* meetings, reports, discussions, and publications to promote scientific interests and inquiry, thereby adding to the health, happiness, and knowledge of all peoples.

ARTICLE III. Eligibility and Affiliation

Section 1. Members, in general, shall be residents of the Southeastern States and shall be known as (A) Active Members *and or* (B) Emeritus Members. **Business or institution members include (C) Business Affiliates, (D) Patron Members, and (E) Library Members.**

Section 2. Any person is eligible for active membership in the Association who is engaged in (A) biological research, (B) the teaching of biological subjects, (C) graduate study in the biological sciences, or (D) work in the various fields of applied biology. **Active members include regular members, student members, contributing members, and sustaining members.**

Section 3. Any member may be elected as Emeritus Member who has been a member of the Association for ten (10) or more consecutive years and who has retired from professional duties. An Emeritus Member shall have the same rights and privileges as an Active Member.

Section 4. Any organization contributing one hundred (100) dollars or more per annum to the support of the Association shall be known as a Business Affiliate. Any individual or organization contributing three hundred (300) dollars or more per annum to the support of the Association shall be known as a Patron. **Patron members who sponsor an ASB award will pay the amount of the award and receive the Patron Membership status free from the Association.** Business Affiliates and

Patrons will receive the publications and notices of the Association and may *attend* **send representatives** to the annual meetings but shall not have the right to vote.

Section 5. Any organized group which is interested in biology may become an affiliate of the Association of Southeastern Biologists upon recommendation of the Executive Committee and approval of the Association at its annual business meeting. The purpose of affiliation is to promote communication and cooperation among the societies involved, but such affiliation does not confer the privilege of individual membership in the Association of Southeastern Biologists upon members of affiliated societies. The terms of affiliation shall be arranged between the Executive Committee of the Association of Southeastern Biologists and each affiliate society.

ARTICLE IV. Officers

The officers of the Association shall be (A) President, (B) President-Elect, (C) Vice President, (D) Secretary, and (E) Treasurer.

ARTICLE V. Annual Meeting

Section 1. The annual meeting of the Association shall be held in April at such place as may be recommended by the Executive Committee and approved by the membership at an annual business meeting. The date of the meeting shall be determined by the Executive Committee.

Section 2. In case of an emergency, the Executive Committee may change the time and place of the annual meeting or may call a special meeting.

ARTICLE VI. Quorum

Fifty (50) members of the Association shall constitute a quorum for the transaction of business.

ARTICLE VII. Disposition of Property

In the event of the dissolution or termination of the Association, title to and possession of all the property of the Association shall pass forthwith *to the American Institute of Biological Sciences, Washington, D.C., if then in existence and qualified for exemption under the Internal Revenue Code of 1954 as amended, and otherwise* to the American Association for the Advancement of Science, Washington, D.C.

ARTICLE VIII. Incorporation

The Executive Committee, with the approval of the membership in a vote at an annual **business** meeting, may apply for incorporation of the Association as a non-profit scientific and educational organization without capital stock under the laws of any of the southeastern states within its area.

ARTICLE IX. Amendments

Section 1. This Constitution may be amended at any annual **business** meeting by a three-fourths majority of those present, provided due notice of said amendment has been sent by the Secretary to each member at least thirty (30) days in advance of the meeting, *and* provided the amendment has been proposed by the Executive Committee or by a committee authorized by the Association at a previous annual meeting, **and** provided that so long as the Association shall be or remain an organization exempt under Section 501 (c)(3) of the Internal Revenue Code of 1954, as amended, no amendment shall be made to Article II or Article

VII of this Constitution without consent having been obtained from the Internal Revenue Service.

Section 2. Amendments to this Constitution shall become effective at the close of the annual meeting at which they *were* **are** adopted.

BY-LAWS

ARTICLE I. Membership

Section I. Membership shall be granted any eligible person upon receipt of *his* a written application and dues payment for the current year. The application shall include the signature of one active member in good standing, certifying eligibility.

ARTICLE II. Election of Officers

Section 1. (A) Annually the nominating committee shall prepare a multiple slate of nominees for each office or vacancy to be filled. Members are privileged to recommend to the nominating committee persons for any or all offices.

(B) The slate of the nominating committee shall be presented to the membership on or before Thursday evening of the Annual Meeting, and the election shall be held at the following business session when nominations will be called for from the floor.

(C) The Secretary shall prepare ballots for distribution. These ballots shall be distributed and collected by three tellers appointed by the President. A majority vote will constitute election to office. Where more than one person is to be elected to a position (e.g., members of the Executive Committee), the two or more receiving the highest number of votes shall be declared elected.

(D) The results of the election shall be announced as soon as possible after the tellers have counted the ballots, and the successful candidates shall be presented to the membership. All ballots shall be deposited with the Secretary who shall retain them for one year.

Section 2. (A) A President-Elect shall be elected annually and shall become President at the close of the next annual meeting following election.

(B) A Vice President shall be elected annually. Neither the President nor the Vice President shall be immediately eligible for re-election.

Section 3. (A) A Secretary and (B) a Treasurer shall be elected for a term of three (3) years each, and they shall be eligible for immediate re-election to additional terms. The Secretary and Treasurer shall not be elected to office in the same year except to fill an unexpired term.

Section 4. Should an office other than that of President *and or* that of President-Elect become vacant during the year, the Executive Committee shall appoint a member to fill that office until the next election.

Section 5. Newly elected officers shall assume the duties of their offices at the close of the annual meeting in which they were elected except the Treasurer who shall assume *his* duties on 1 January of the following year.

ARTICLE III. Duties of Officers

Section 1. The President shall be the directing officer of the Association, shall perform the duties usual to that office, and shall appoint, with the advice of the Executive Committee, regular committees, special committees authorized by the Executive Committee, and a representative to the American Association for the Advancement of Science (AAAS) *and The American Institute of Biological Sci-*

ences (AIBS). Also, he the President shall appoint such other special committees as may be required and shall notify Emeritus members of their election.

Section 2. The President-Elect shall be responsible for organizing the program for the *first evening general session of the annual meeting*, and shall be responsible for promoting membership in the Association. In the event of the resignation, death, or incapacity of the President-Elect during his **or her** term of office, the Executive Committee shall declare the person who received the next highest number of votes for the office to be President-Elect. If this individual is unable to accept, the Executive Committee shall nominate two members for the office, to be voted upon by the membership by mail ballots.

Section 3. The Vice President shall be the public relations officer of the Association. In the absence of the President from any meeting the Vice President shall discharge the duties of the office. In the event of the death or resignation of the President, the Vice President shall become President of the Association.

Section 4. The Secretary shall keep records of the meetings of the Association and of the Executive Committee, conduct the routine business of the Association pertaining to the office, *maintain a roster of the membership, issue a call for suggestions for nominations stating the time during which these suggestions will be received and listing names and addresses of all members of the Nominating Committee, issue a call for papers for the program and work with the Program Committee in arranging the program*, attend to the preparation and distribution of ballots at elections, **and** report the activities of *his this* office to the Association at the annual meeting, *notify Emeritus Members of their election, and give proper recognition to Business Affiliates and Patrons.* The Secretary of the Association shall be Ex-Officio Associate Editor of The ASB Bulletin. *and shall be responsible for providing the Editor with all official announcements, documents, programs and abstracts of papers to be published in the Bulletin.* In addition **he the Secretary** shall be authorized to sign appropriate papers in case the Treasurer is incapacitated.

Section 5. The Treasurer shall receive and disburse all funds of the Association, *keeping the necessary records of dues and funds expended and maintain a roster of the membership.* He **or she** shall at all times coordinate the efforts of *his this* office with those of the offices of the Secretary and of the Editor, and shall report annually all receipts and expenditures to the membership. **He The Treasurer** is authorized to reimburse the Secretary for expenses incurred in attending the annual meeting of the Association and interim meetings of the Executive Committee. The Executive Committee may by special action also authorize the Treasurer to reimburse other officers of the Association for all or a portion of expenses incurred in attending interim meetings of the Executive Committee, not to exceed one per year. The Treasurer of the Association shall be Ex-Officio Business Manager of The ASB Bulletin.

ARTICLE IV. Dues and Fees

Section 1. The annual dues of the Association *for Active Members* shall be *five dollars (\$5.00) for graduate students, ten dollars (\$10.00) for regular members, twelve dollars (\$12.00) for contributing members, twenty-five dollars (\$25.00) for sustaining members, and \$12.00 for family membership. Members elected as Emeritus Members after 1 January 1976 shall pay one (1) dollar annual dues. set by the membership following recommendation by the Executive Committee.*

Section 2. The fiscal year of the Association shall be from January 1 to December 31.

Section 3. Any member in arrears in the payment of dues in excess of one (1) year at the close of the Annual Meeting shall be dropped from the membership roster by 1 June of that year.

Section 4. Delinquent members who desire reinstatement to membership shall pay a reinstatement fee of *eight (8) dollars one year's dues* in addition to the regular dues for the current fiscal year. If the membership has lapsed over five (5) years, the individual must reapply as a new member.

ARTICLE V. The ASB Bulletin

Section 1. The ASB Bulletin shall be the official publication of the Association, and shall be published quarterly or at such other regular intervals as may be determined by a vote of the membership upon recommendation by the Executive Committee.

Section 2. The Editor of The ASB Bulletin shall be a member of the Association, responsible for the editing and publication of the Bulletin, and shall be selected and appointed by the Executive Committee for a term of three years. The Editor shall be eligible for reappointment for any number of successive three-year terms. Upon the recommendation of the Editor, the Executive Committee may appoint a Circulation Manager for the Bulletin.

Section 3. The ASB Bulletin shall be supplied to all members of the Association without charge beyond the stated annual dues. Organizations may subscribe to The ASB Bulletin at a rate equal to the annual dues for contributing members, but such subscriptions will not carry the privileges of membership in the Association. The Executive Committee, upon the recommendation of the Editor, may establish special prices for back issues or volumes of the Bulletin.

Section 4. Any major change in editorial policy proposed by the Editor shall be subject to the approval of the Editorial Board.

ARTICLE VI. Executive Committee

Section 1. (A) The Executive Committee shall be in charge of the affairs of the Association between the Annual Meetings. (B) This Committee shall be composed of the officers of the Association, the immediate Past President, and six (6) members elected from the membership.

Section 2. The six **elected** members of the Executive Committee *elected as such* shall serve for *a* terms of three (3) years, two members being elected each year. These members are eligible for re-election to the Executive Committee. Should a vacancy occur among these six members, the Executive Committee shall appoint a member to serve until the next election.

Section 3. The Executive Committee shall select and appoint an archivist who shall be custodian of the permanent records or archives and shall, with the approval of the Executive Committee, make such arrangements as may seem appropriate for the collection, care, and maintenance of such records. The archivist shall serve for a term of three years and shall be eligible for reappointment for any number of successive 3-year terms.

Section 4. The Editor of The ASB Bulletin and the Archivist shall be Ex-Officio Members of the Executive Committee with the power of discussion and the privilege of proposing motions but shall not have the right to vote.

Section 5. The Executive Committee shall serve as an Ex-Officio Editorial

Board for the Bulletin and shall be responsible for determining the major editorial policies of the Bulletin in consultation with the Editor.

Section 6. A majority of the Executive Committee shall constitute a quorum, provided all members have been notified of the proposed meeting.

ARTICLE VII. Regular Committees

Section 1. The following regular committees shall be appointed by the President upon the approval of the Executive Committee:

- A. Auditing Committee
- B. Nominating Committee
- C. **Faculty** Research Awards Committee
- D. Student Research Awards Committee**
- E. Meritorious Teaching Award Committee
- F. Travel Award Committee
- G. Place of Meeting Committee
- H. Local Arrangements and Program Committee
- I. Resolutions Committee
- J. Conservation Committee

Section 2. The duties of the regular committees shall be as follows:

A. The Auditing Committee shall examine the records of the Treasurer prior to the annual business meeting of the Association and shall report the condition of the accounts to the membership at this meeting.

B. The Nominating Committee shall, with due consideration of suggestions received from the membership, prepare a multiple slate of nominees for each office or vacancy to be filled.

C and D. The Research Awards Committees shall each year select *a* recipients of the Association Research Prizes *offered by Carolina Biological Supply Company*.

E. The Meritorious Teaching Award Committee shall each year select a member of the Association to receive an award for meritorious teaching.

F. The Travel Award Committee shall make monetary awards to assist graduate students to attend the annual ASB meetings.

G. The Place of Meeting Committee shall recommend to the Executive Committee the place where the annual meeting shall be held.

H. The Local Arrangements and Program Committee shall make arrangements for the annual meeting including receipt and scheduling of scientific papers to be presented.

I. The Resolutions Committee shall formulate and present to the Association through the Executive Committee such resolutions as may be considered worthy of action by the Association.

J. The Conservation Committee shall accumulate facts with reference to environmental problems, shall disseminate such information to the membership at its (the Committee's) discretion, and **shall** bring new resolutions concerning matters of significance to the attention of the Executive Committee, through the Resolutions Committee, for presentation to the membership.

Section 3. The Executive Committee may from time to time establish special ad hoc committees as needed. The members of all such committees shall be appointed by the President.

ARTICLE VIII. Papers

Section 1. All titles of papers and abstracts submitted for the program shall be in the hands of the *Secretary two (2) months before the date set for the annual meeting. Program Committee by the date set by the Editor and announced in the Call for Papers.*

Section 2. Each title submitted shall be accompanied by two (2) copies of an abstract *of not more than two hundred (200) words. following the guidelines in the Call for Papers.*

Section 3. Except by special action of the Program Committee the maximum time allowed for the presentation of a paper shall be ten (10) minutes. The presiding officer will enforce this rule.

Section 4. Papers presented before the Association at the annual meeting shall be read only by members or by persons introduced by members.

ARTICLE IX. Amendments

Section 1. These By-Laws may be amended at any annual **business** meeting of the Association by a two-thirds majority vote of those present.

Section 2. Amendments to these By-Laws shall take effect at the close of the meeting at which they were adopted.

U.S. Postal Service
STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
Required by 39 U.S.C. 3685

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FULL NAME Association of Southeastern Biologists, Inc.		COMPLETE MAILING ADDRESS Chapel Hill, NC (Dr. William J. Koch, Associate Professor, Dept. of Botany, University of North Carolina, Agent)		
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Book Review

Podolsky, A. S. 1984. New Phenology: Elements of Mathematical Forecasting in Ecology. John Wiley & Sons, New York. \$64.95. 504 pp., hardcover.

Undoubtedly most Western researchers involved in phenology research will be caught by surprise at the appearance of this book. Podolsky, who is Russian, emigrated to Israel in 1980 and this book represents the 3rd edition (but first in English) of his work. The ability to make accurate predictions of phenology has tremendous implications in ecology, agriculture, and medicine and this book deals with both experimental and mathematical methodologies for computing the developmental dates of plants and cold-blooded animals. Hence, Podolsky's claim that this book "... presents a method for making such calculations that is more scientific, more accurate, and quicker than other methods" quickly catches one's attention.

Briefly, Podolsky's approach utilizes "phenotemperature nomograms" to superimpose temperature and those non-temperature factors which affect the development of plants and poikilotherms. Over 130 such nomograms appear in Chap. 1 alone and some are so cluttered that they are extremely difficult to understand. The literature cited is almost exclusively Russian (it's hard to imagine a phenology book without a reference to Thornthwaite) so the reader is provided some insight into science in the USSR apparently conducted in isolation. Podolsky provides an interesting chapter on criticisms of his approach and another on future prospects but, again, his perspective is limited to work conducted in the USSR so it's hard to see the justification of his claims as quoted above. (*James F. Reynolds, Department of Botany, North Carolina State University, Raleigh, NC.*)

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. R. L. Beckmann, Dept. of Botany, N.C. State Univ., Raleigh, NC 27695-7612.

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News of Biology in the Southeast

Jon R. Fortman—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Georgia

University of Georgia, Institute of Ecology. Often called the “father of modern ecology,” *Eugene Odum*—Alumni Foundation Distinguished Professor of Zoology and Fuller E. Callaway Foundation Professor of Ecology—retired this year from his faculty position at the University of Georgia. He was honored by the Institute of Ecology, which he founded in 1961, during a special two-day event September 17 and 18. More than a generation of ecologists have learned the basics of their science from *The Fundamentals of Ecology*, the popular textbook first written by Dr. Odum in 1953. Another generation, not of scientists, but of citizens awakening to environmental concerns, became familiar with concepts such as “ecosystems” and “energy flow” at least partly through his smaller, paperback book titled simply *Ecology*, as well as through his many popular essays and lectures. Odum has received the two highest international awards in his field, the Prix de l’Institute de la Vie in 1976, and the Tyler Award in 1977. He is also a member of the National Academy of Sciences. He has been named Educator of the Year by the National Wildlife Federation and has received numerous other awards, including the Eminent Ecologist award from the Ecological Society of America in 1974. At the University of Georgia he founded three major research units: the Institute of Ecology, the Savannah River Ecology Laboratory, and the University’s Marine Institute on Sapelo Island.

Kentucky

Murray State University, Department of Biological Sciences and Hancock Biological Station. *Dr. Wesley Shoop* is a new faculty member whose research interests are in parasitology, especially the life cycle and host interaction of *Alaria marcianae*. The Hancock Biological Station has been chosen as the site for the 1985 annual meeting of the Organization of Biological Field Stations.

Western Kentucky University, Department of Biology. *Dr. Thomas P. Coohill*, Professor of Biophysics, has been elected to the Governing Council of the American Society for Photobiology. *Dr. Rudolph Prins*, Professor of Biology, recently returned from Valdivia, Chile, where he was studying the quality of life in streams under an award from The Organization of American States.

Mississippi

Gulf Coast Research Laboratory, Ocean Springs. *Harriet Perry*, Associate Biologist in the fisheries division, has been reappointed to the Gulf of Mexico Fishery Management Council’s Special Groundfish Committee for 1984–85. The Laboratory has received approval from the Board of Trustees of State Institutions of Higher Learning to sign affiliation agreements with Henderson State University of Arkadelphia, Ark., and Our Lady of Holy Cross of New Orleans, La., for the purpose of GCRL training their students in the marine sciences. *Dr. Richard Heard*, Associate Marine Biologist in parasitology, *Sara LeCroy*, and *Gary Goeke* will undertake the examination of approximately 4000 Antarctic cumaceans, a group of crustaceans that is little known, but abundant and bionomically important in marine waters. This work is to be accomplished under a contract with the Smithsonian Institution, with funding through NSF. The Smithsonian Oceanographic Sorting Center is to provide the specimens, which have been collected by various expeditions during the past 20 years. *Dr. James I. Jones*, director of the Mississippi-Alabama Sea Grant Consortium will serve as SGA president for

the 1984-85 term. The **J. L. Scott Marine Education Center** was formally opened in July and is located in Biloxi, Ms. The aquarium area of the Center was designed to illustrate the transition from fresh water to salt water habitats in the natural environment. The focal point is the 30-foot diameter Gulf of Mexico tank which holds 40,000 gallons of water. *Stanley Hecker*, Associate Director of Programs, received his Ph.D. in adult education from the University of Southern Mississippi. Prior to his coming to Mississippi, he was Deputy Director, North Carolina Office of Marine Affairs.

North Carolina

East Carolina University, Department of Biology. *Claudia L. Jolls* (Ph.D., University of Colorado) has been appointed Assistant Professor. She is a graduate of the University of Michigan, and recently served as Assistant Research Scientist and Coordinator of the Ecologist Training Program at the University of Michigan Biological Station. *Dr. Edward W. Baptist* (Ph.D., Massachusetts Institute of Technology) has been appointed to the position of Lecturer. He is a graduate of William and Mary and received his doctorate in the area of biochemistry. He has previously served as Senior Research Scientist with Southern Biotech and will be working with the biotechnology program.

Warren Wilson College, Biology and Environmental Studies. *Dr. Alan Haney* has received a grant from the U.S. Forest Service, Superior National Forest, to investigate initial effects of Round-up® (herbicide) applications on the composition of forest communities that had been treated during site preparation. The Biology Department is now planning to organize a Tropical Biology course to be taught in Costa Rica in the summer of 1985. The course will be 4 credits and cover 4 weeks, mostly in montane rain forest. If interested, contact *Dr. Tom McKinney*. Cost is estimated to be about \$850, including transportation.

North Carolina State University, Department of Zoology. *Dr. David M. Miller* will join the department as an Assistant Professor, upon completion of a postdoctoral program in Cambridge, England. He will teach and conduct research in the area of cellular biology. *Dr. Richard L. Noble* has been appointed Professor of Zoology and Forestry and Coordinator of the Fisheries and Wildlife Program. *Dr. Noble* was formerly at Texas A&M University.

Western Carolina University, Department of Biology. *Dr. Fred D. Hinson*, Associate Professor of Biology, is one of 29 professors to be honored by receiving a certificate of merit for outstanding achievement in academic advising in 1984. The award is sponsored by The American College Testing Program and the National Academic Advising Association. Professors *James W. Wallace, Jr.* and *J. Dan Pittillo* recently returned to the campus after participating in a Faculty Exchange Program at Yunnan University, Kunming, People's Republic of China. They presented numerous lectures in China and Japan while on the Exchange.

North Carolina State University, Department of Botany. Two visiting botanists are spending their sabbaticals on the Raleigh campus. *Dr. John A. Ludwig*, Professor of Botany, New Mexico State University, is collaborating with *Dr. James F. Reynolds* in the area of mathematical ecology. *Dr. Michael A. Torres*, Chairman of the Biology Program at St. Andrews College, is working with *Dr. J. P. Miksche* on DNA quantity and quality in tobacco.

University of North Carolina at Wilmington, Department of Biological Sciences. The following faculty have been added to the department: *Alan Hulbert* (Ph.D., University of New Hampshire), Associate Professor in marine ecology and will serve as the Director of the Undersea Program funded by NOAA; *Timoth A. Ballard* (Ph.D., Wake Forest University), Assistant Professor with expertise in Comparative Human Physiology and Endocrinology; *Diane Dodd* (Ph.D., Yale University), Assistant Professor with expertise in molecular and population genetics; *David Webster* (Ph.D., Texas Tech University), Assistant Professor, with research in mammalogy. *Dr. Courtney T. Hackney* will devote 50% of his time in the upcoming academic year to the U.S. Army Corps of Engineers. He will be assisting in a study of an oligohaline marsh in San Francisco Bay. *Dr. Mark LaSalle*, Ph.D., Mississippi State University, will serve as post-doctoral fellow on the study.

Duke University, Department of Botany. *Brent Mishler* (Ph.D., Harvard University) has joined the faculty as Assistant Professor. *Mishler* is a bryologist; he replaces Professor *Lewis E. Anderson*, who recently retired.

South Carolina

College of Charleston, Department of Biology. *Dr. Robert Frankis* has joined the faculty, coming from the Medical University of South Carolina. His research deals with the regulation of gene expres-

sion in eucaryotic cells. *Dr. Robert Dillon* has received funding from the South Carolina Sea Grant Consortium to study the genetics of the clam *Mercenaria mercenaria*, particularly with respect to analyzing the possible use of hybridization in the aquaculture of this species. *Dr. Phillip Dustan* is analyzing data resulting from an extended study of the Amazon River on board the R/V *Calypso*.

Tennessee

Memphis State University, Department of Biology. Members of ASB were saddened to hear of the death of *Dr. Glen E. Peterson*, Professor of Biology and Bacteriology. Services were in Iowa and in Minnesota.

Union University, Department of Biology. *Dr. R. Terry Spohn* (Ph.D., Texas Tech), formerly on the faculty at the University of South Carolina at Columbia, is a new faculty member beginning this Fall term.

Vanderbilt University, Department of General Biology. Professor *Robert Kral* has been granted a leave of absence this Fall semester to participate in an expedition into Cerro de Neblina, T. F. Amazonas, in Venezuela. This expedition is sponsored through the U.S. Government, the Venezuelan Government, and the National Geographic Society. *Dr. Susan Brawley* has returned from the People's Republic of China where she pursued her research, which was funded by the NSF, on "Algal/Micro-herbivore Interactions and Their Application to Mariculture."

University of Tennessee at Chattanooga, Department of Biology. *Dr. N. Gene Vredevel* has been promoted to the rank of Professor. *Dr. Vredevel* is teaching at Glasgow College of Technology, Glasgow, Scotland, for the academic year 1984–1985 under the Fulbright Teacher Exchange Program.

Virginia

University of Richmond, Department of Biology. The University was host to the annual meeting of the Virginia Academy of Science and the Virginia Junior Academy of Science in May (1984). *Dr. Katherine J. Schneider* is regional coordinator for the Breeding Bird Atlas. *Mrs. Janet Nolin* has received a three-year extension of her grant from NIH to continue research in "Regulatory Cell Biology of Prolactin Targets." *Dr. Joseph C. Mitchell* has a three-year grant to complete research for the book on the "Natural History and Ecology of the Reptiles and Amphibians of Virginia."

University of Virginia, Department of Biology. *Dr. Blaine J. Cole* and *Dr. Diane R. Campbell* have accepted appointments as Assistant Professors of Biology effective September 1984.

The College of William and Mary, Department of Biology. *Drs. Donna M. E. Ware*, Curator of the Herbarium, and *Stewart Ware*, Plant Ecologist, have both been on research leave at the University of Arkansas at Fayetteville for the fall semester. *G. W. Hall*, Plant Taxonomist, and *Ruth A. Beck*, Ornithologist, will be on research leave for the spring semester. *Jeffrey Lucas* has joined the department for the year as Visiting Assistant Professor of Ecology, and *Anna Vascott* serves as Acting Curator of the Herbarium.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

The Marie Selby Botanical Gardens, Sarasota. Using photographs and descriptions of the late Rudolf Schlechter's type specimens, *Dr. John Atwood* has been able to re-identify a rare "lost" orchid. Several years ago, *Mrs. Andre Millar* donated a number of New Guinea orchids, and one of them flowered into what appeared to be a greenish yellow *Dendrobium spectabile*. *Dr. Atwood*, however, was skeptical in view of the flower's coloring, and some other characteristics, so he was able to locate some photographs and drawings from Schlechter's collection, which was destroyed in WWII. His research revealed that this orchid matched perfectly the description and illustration given by Schlechter in 1912 for *Dendrobium alexandrae*, which he had named after his wife Alexandra.

Mississippi

Mississippi Museum of Natural Science, Jackson. *Ed Bronikowski*, Chief Aquarist of the Cleveland Aquarium, has recently visited MMNS to view the aquarium hall and will provide his expertise as a

consultant on a project for renovation and updating of the Museum's aquaria. Aquaria stocked with native Mississippi fish have been an important part of the exhibit program at MMNS since 1973, and Museum visitors have rated them as their favorite exhibits during interpretation evaluations. The new plan calls for larger tanks, better lighting, and an improved filtration system. When the renovation has been completed, visitors will be able to enjoy native fish, amphibians, reptiles, and aquatic invertebrates in a more comfortable viewing area.

ABOUT BIOLOGICAL STATIONS

The Highlands Biological Station. Offerings for 1985 are:

- Field Biology of the Southern Appalachians, June 3–July 5; 6 sem. hrs.
- Workshop in Larval Amphibian Biology, June 3–7; 2 sem. hrs.
- Simulation of Ecosystem Dynamics, June 24–July 5; 3 sem. hrs.
- Fleshy Fungi of the Southern Appalachians, July 8–August 9; 6 sem. hrs.

For information regarding course content, instructors, application forms, research grants-in-aid, and scholarship programs, contact the *Executive Director*, P.O. Box 580, Highlands, NC 28741.

Mountain Lake Biological Station. Summer Field Courses for 1985 are:

First Term (June 9–July 13)

- Biology of Birds, *David W. Johnston*, George Mason University
- Field Botany of the Southern Appalachians, (TBA)
- Plant–Animal Interactions, *Beverly J. Rathcke*, University of Michigan and *Earl D. McCoy*, University of South Florida
- Biology of Fish, *Arthur J. Bulger*, University of Virginia
- Workshop in Allozyme Techniques, (TBA)
- Techniques and Materials for Scientific Illustration, *Esta L. Johnston*, George Mason University

Second Term (July 14–August 17)

- Quantitative Methods in Field Biology, *Joseph Travis*, Florida State University and *Henry Wilbur*, Duke University
- Animal Social Behavior, *Blaine J. Cole*, University of Virginia
- Plant Population Biology, *Janis Antonovics*, Duke University and *Leslie A. Real*, North Carolina State University
- Mammalogy/Wildlife Ecology, *R. Terry Bowyer*, Unity College
- Workshop in Allozyme Techniques, (TBA)

Scholarships Available: Service Awards for students covering room and board costs. Post-Doctoral Research Awards (10 weeks).

EVOLUTIONARY BIOLOGY Post-doctoral fellowships are available for summer research at the Mountain Lake Biological Station of the University of Virginia. These awards, funded by the University of Virginia, are for the purpose of promoting field research by young investigators who have recently received their Ph.D. degree. Proposals will be considered for a wide variety of ecological and evolutionary studies. Deadline for applications: 1 March 1985.

For further information and application, write to: *Dr. Jerry O. Wolff*, Director, Mountain Lake Biological Station, Gilmer Hall, University of Virginia, Charlottesville, VA 22901.

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The ASB

BULLETIN

Volume 32, Number 2

April 1985

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*The Official Quarterly Publication of
The Association of Southeastern Biologists*

ASB BULLETIN

(ISSN 0001-2386)

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JAMES W. HARDIN

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COVER

Campus of Middle Tennessee State University. *Top left:* Davis Science Building, Biological Sciences; *top right:* Science Hall, Biological Sciences; *bottom:* Keathley University Center. Photographs courtesy of Jack Ross, MTSU photographer.

TIME AND PLACE OF FUTURE MEETINGS

1987 University of Georgia, Athens (50th Anniversary)

PATRON MEMBERS

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Program of the 46th Annual Meeting of the Association of Southeastern Biologists

Middle Tennessee State University

SOCIETIES MEETING WITH ASB IN MURFREESBORO

**Beta Beta Beta, Southeastern Region
Botanical Society of America, Southeastern Section
Ecological Society of America, Southeastern Chapter
Southern Appalachian Botanical Club**

GENERAL INFORMATION

Registration—Registration for the 46th annual meeting of the Association of Southeastern Biologists, purchase of tickets for the banquet, breakfasts, luncheons, and other special events should have been arranged through pre-registration with the local Arrangements Committee. Pre-registrants may obtain their information packet and tickets at the Ramada Inn registration desk on Wednesday, April 10 from 5 P.M. until 9 P.M. On Thursday and Friday, April 11 and 12, packets and tickets will be available at the ASB registration booth on the second floor of the Keathley University Center. Late registration is possible at these times and locations. Late registration fees are \$8.00 for students and \$12.00 for regular members. Please bring your *ASB Bulletin* (April 1985) to the meeting as free copies will not be available at MTSU. Extra copies may be purchased at the ASB registration booth for \$3.00 each.

Parking and Shuttle Service—ASB registrants and guests may park on campus in any space not marked by yellow curb. Parking lots on the north side of campus along Greenland Drive and near the maintenance and security complex are marked for ASB participants and are about a five minute walk from Keathley University Center (see campus map inside back cover). Additional parking lots are located near most major buildings. Interior parking areas are full prior to 8 A.M. A shuttle service will operate between the Ramada Inn and Holiday Inn motels and campus. The schedule is: Thursday, 7–9 A.M. and 3–5 P.M. and Friday, 7–9 A.M. and 4–6 P.M. A van will pick up and deliver participants approximately every 30 minutes during the scheduled periods.

Placement Service—Message boards are available on the third floor of the Keathley University Center for those wishing to post job announcements and for those seeking positions.

Dining and Lounge Facilities—Meals may be obtained in the Keathley University Center and faculty dining room in the James Union Building. In addition, a list of restaurants in Murfreesboro is included in the registration packet.

Social Activities for Conference Guests—On Thursday and Friday organized and informal activities are available for guests not participating in the meetings and sessions.

Music City Tour and sightseeing of some of Nashville's major points of interest. (Thursday, April 10, 8:30 A.M.–1:00 P.M. with fee of \$16.50; meal dutch treat.)

Self-Guided Tours of points of interest in Murfreesboro and immediate surroundings will be announced in the registration packet.

Jack Daniel Distillery Tour and Picnic at Cumberland Springs—A tour of the historic distillery, a picnic with all the trimmings, and the Jack Daniel bluegrass band will be featured. If you did not pre-register, inquire early for reservations (Thursday, 4 P.M.–11 P.M., \$10 fee includes transportation).

The ASB Banquet—The ASB Banquet and program will be held in the Tennessee Room of the James Union Building.

Field Trips—Field trips depart from the Ramada Inn on Saturday morning. The fee for the Savage Gulf trip includes a box lunch. 1. Savage Gulf (8:00 A.M.–4:30 P.M.)—\$7.00; 2. Stones River Battlefield (8:30 A.M.–10:30 A.M., 10:30 A.M.–12:30 P.M.)—\$2.00; 3. Cedar Glades (9:00 A.M.–12:00 Noon)—\$3.00.

Tickets for Scheduled Meals and Events—Pre-registrants will receive the requested meal and special event tickets with their registration packets. A limited number of tickets for some events will be available for those who did not pre-register.

BREAKFASTS, LUNCHEONS AND DINNERS are all scheduled for the James Union Building. Southeastern Chapter of the Ecological Society of America (Friday luncheon)—\$6.00; Southern Appalachian Botanical Club and Southeastern Section, Botanical Society of America (Thursday breakfast)—\$5.00; Beta Beta Beta (Friday luncheon)—\$5.00; ASB Banquet (Friday evening)—Student \$8.00, Regular \$10.00.

SPECIAL EVENTS. Jack Daniel Distillery Tour and Picnic (Thursday evening)—\$10.00.

Useful Telephone Numbers (Area Code 615)—

Middle Tennessee State Switchboard and Information 898-2300
Middle Tennessee State Security 898-2300, ext. 2424
Middle Tennessee State Biology Department 898-2300, ext. 2847
Ramada Inn (Host Motel) 896-5080
Best Western Wayside Inn 896-2320
Days Inn 893-1090
Howard Johnson's 896-5522
Quality Inn 896-5450
Holiday Inn 896-2420

Travel Inn 896-3210
Safari Lodge 896-5446
Ambulance Service, Rutherford County 896-2520
Middle Tennessee Medical Center 893-8240
Murfreesboro Fire Department 893-1622
Murfreesboro Police Department 893-1311

Local Arrangements Committee—(All telephone numbers are extensions of 615/898-2300)

Chairman: *George G. Murphy* 2292
Program: *Mary C. Dunn* 2060
Pre-Registration and Registration: *Philip M. Mathis* 2061
Audio-Visual: *Ralph E. Sharp* 2058
Exhibits and Exhibitors: *Marion R. Wells* 2063
Field Trips: *Patrick J. Doyle* 2069
Social Activities: *Wayne C. Rosing* 2040
Transportation and Parking: *Charles R. McGhee* 2057

ANNOUNCEMENT FOR ECOLOGISTS

The Southeastern Chapter of the Ecological Society of America will present an award consisting of \$100 cash prize and a plaque for the best ecological paper presented by a student at the ASB Meeting beginning 1985.

The paper will be evaluated by a panel of judges at the time of presentation on the following points: (a) Significance of Ideas; (b) Creativity; (c) Quality of Methodology; (d) Validity of Results; (e) Clarity of Presentation.

Eligibility Requirements:

- (a) Undergraduate and graduate students are eligible;
- (b) The student must be the sole or senior author;
- (c) The paper must deal with a clearly ecological topic and should be presented in any of the following sessions: Aquatic Ecology, Plant Ecology, or Animal Ecology;
- (d) The paper must be presented in a regular contributed session; papers presented in poster sessions or symposia are ineligible;
- (e) The student does not have to be a member of SE/ESA;
- (f) The title and abstract of the paper has been submitted to the Award Coordinator by March 1. This can be a copy of the abstract submitted to ASB November 1.

All ASB and SE/ESA members are requested to disseminate this information to all parties concerned. Students interested in entering a paper for the 1985 award competition should submit the title and abstract to: Dr. Armando A. de la Cruz, SE/ESA Award Coordinator, Department of Biological Sciences, Mississippi State University, P.O. Drawer GY, Mississippi State, MS 39762. ***Because of the delay in this announcement, the Award Coordinator will accept abstracts until April 5 for the 1985 competition.***

Program Summary

WEDNESDAY, APRIL 10, 1985

- 5:00 P.M.–9:00 P.M. Pick up registration packets by pre-registrants; Late registration, Ramada Inn (see map on back—I24, exit 81)
- 6:00 P.M.–11:00 P.M. Social mixer with cash bar, Ramada Inn
- 7:00 P.M. Executive Committee Meeting, Ramada Inn
- 7:30 P.M. **Special Symposium:** “Plant Genetic Engineering: Update and Teaching of Undergraduates”; Organized by Michael Torres; Sponsored by Southeastern Section, Botanical Society of America, Davis Science Building, Room 100

THURSDAY, APRIL 11, 1985

- 7:00 A.M.–4:00 P.M. Pick up registration packets by pre-registrants; Late Registration and Information, Keathley University Center
- 7:00 A.M.–8:30 A.M. Business and Breakfast Meeting, Southern Appalachian Botanical Club and Southeastern Section, Botanical Society of America, James Union Building, Dining Room B
- 8:00 A.M.–5:00 P.M. Exhibits, Keathley University Center, 3rd Floor
- 8:00 A.M.–5:00 P.M. Placement Service, Keathley University Center
- 8:00 A.M.–4:00 P.M. Beta Beta Beta Registration, Keathley University Center

Paper Sessions: Keathley University Center

- 8:30 A.M.–11:00 A.M. Plant Ecology, Session I, Room 324
- 8:30 A.M.–11:00 A.M. Plant Ecology, Session II, Room 324A
- 8:30 A.M.–11:00 A.M. Plant Systematics, Session I, Room 322
- 8:30 A.M.–11:00 A.M. Plant Systematics, Session II, Room 322A
- 8:30 A.M.–11:00 A.M. Aquatic Ecology, Session I, Room 318
- 8:30 A.M.–11:15 A.M. Cytology/Genetics/Molecular Biology, Session I, Room 305
- 9:30 A.M.–10:30 A.M. Plant Physiology, Session I, Room 316
- 9:30 A.M.–11:00 A.M. Cryptogamic Botany, Session I, Room 313

Plenary Session: Keathley University Center Theatre

- 11:15 A.M.–12:30 P.M. **Welcome: Dr. Sam H. Ingram**, President, Middle Tennessee State University
Response: Dr. J. C. O’Kelley, ASB President, University of Alabama
Featured Address: “Euglenoid Flagellates: Model Systems for Experimentation,” **Dr. Patricia L. Walne**, Department of Botany, University of Tennessee, Knoxville, Tennessee
- 12:30 P.M.–1:30 P.M. Biotic Communities of the Southeastern United States—Editors and Contributors Meeting; **Informal Luncheon**, James Union Building, Dining Room B

Paper Sessions: Keathley University Center

- 1:30 P.M.–5:20 P.M. Symposium: Biota, Ecology and Ecological History of Cedar Glades, Room 324; Co-sponsored by the Southeastern Chapter of Ecological Society of

	America and the Association of Southeastern Biologists; Organized by Paul Somers, Tennessee Department of Conservation, Nashville, Tennessee
1:30 P.M.–3:45 P.M.	Ichthyology/Herpetology, Session I, Room 322
1:30 P.M.–3:45 P.M.	Ichthyology/Herpetology, Session II, Room 322A
1:30 P.M.–4:15 P.M.	Aquatic Ecology, Session II, Room 318
1:30 P.M.–2:45 P.M.	Parasitology, Session I, Room 316
1:30 P.M.–4:30 P.M.	Invertebrate Zoology, Session I, Room 305
1:30 P.M.–2:00 P.M.	Animal Physiology, Session I, Room 313
4:00 P.M.–5:30 P.M.	Busses leave KUC at half-hour intervals for the trip to the Jack Daniel Distillery.

FRIDAY, APRIL 12, 1985

7:00 A.M.	Past Presidents' Breakfast, James Union Building, Dining Room C
8:00 A.M.–4:00 P.M.	Information and Late Registration, Keathley University Center
8:00 A.M.–Noon	Exhibits, Keathley University Center, 3rd Floor
8:00 A.M.–3:00 P.M.	Placement Service, Keathley University Center

Paper Sessions: Keathley University Center

7:55 A.M.–11:10 A.M.	Symposium: Demographic Studies of Rare Plant Species, Room 324; Sponsored by the Association of Southeastern Biologists Conservation Committee; Organized by Robert D. Sutter, Plant Conservation Program, Raleigh, North Carolina
8:00 A.M.–10:30 A.M.	Animal Ecology, Session I, Room 322
9:00 A.M.–9:30 A.M.	Developmental Biology, Session I, Room 318
9:00 A.M.–9:30 A.M.	Teaching, Session I, Room 316

Business and Luncheon Meetings

11:15 A.M.–12:15 P.M.	ASB Annual Business Meeting, Keathley University Center Theatre
12:30 P.M.–2:15 P.M.	Business and Luncheon Meeting of Southeastern Chapter of Ecological Society of America, Dr. David Reichle, speaker, James Union Building Tennessee Room
11:45 A.M.–1:15 P.M.	Beta Beta Beta Luncheon, James Union Building Dining Room B

Paper Sessions: Keathley University Center

1:30 P.M.–2:30 P.M.	Round Table Discussion: Symposium Rare Plants, Room 324 and 324A
2:30 P.M.–4:00 P.M.	Plant Systematics, Session III, Room 316
2:30 P.M.–5:15 P.M.	Plant Ecology, Session III, Room 322
2:30 P.M.–5:15 P.M.	Plant Ecology, Session IV, Room 322A
2:30 P.M.–3:45 P.M.	Cryptogamic Botany, Session II, Room 318

ASB Banquet

7:00 P.M.	ASB Banquet, James Union Building Tennessee Room Presentation of Awards Past President's Address, Dr. Charles E. Jenner
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SATURDAY, APRIL 13, 1985

8:00 A.M.	Executive Committee Meeting, Ramada Inn
8:00 A.M.	Field trip: Savage Gulf Wilderness Area, departs Ramada Inn parking lot

8:30 A.M. & 10:30 A.M. Field trip: Stones River National Battlefield, departs Ramada Inn parking lot
9:00 A.M. Field trip: Middle Tennessee Cedar Glades, departs Ramada Inn parking lot

(NOTES)

The Thursday Morning General Session

EUGLENOID FLAGELLATES: MODEL SYSTEMS FOR EXPERIMENTATION

The speaker for the 1985 General Session is *Dr. Patricia L. Walne*, Professor of Botany at the University of Tennessee, Knoxville.

An internationally known authority on the Euglenophyceae, Dr. Walne has ongoing research collaborations with several laboratories in Europe and has published numerous articles on the ultrastructure, physiology, and taxonomy of algal flagellates, especially the euglenophytes. Major areas of interest include the development and biomineralization of extracellular matrices, and photosensory transduction in these organisms.

Dr. Walne has served on Advisory Panels for the Council for the International Exchange of Scholars and the National Science Foundation, and is a past President of the Phycological Society of America and of the University of Tennessee, Knoxville, chapter of Sigma Xi. She has also served as Editor or member of the Editorial Boards of several journals and books, including the *Phycological Newsletter*, *Journal of Phycology*, *Phycologia*, *Critical Reviews in Plant Sciences*, *Handbook of Phycological Methods*, and *Selected Papers in Phycology*. Her many awards include the Botanical Society of America's Darbaker Prize for meritorious research on microalgae, and selection as the 1982-83 Macebearer for the University of Tennessee, Knoxville, a Senior Fulbright-Hays Research Scholar to the University of Copenhagen, Denmark, and a National Academy of Sciences, U.S., Exchange Scientist to Poland.

Dr. Walne is recognized as an outstanding teacher and will certainly give an interesting presentation for all biologists. This presentation is co-sponsored by ASB and the Southeastern Section of the Botanical Society of America.

ASB Paper Sessions and Symposia

WEDNESDAY EVENING, APRIL 10

Special Symposium—Davis Science Bldg., Room 100 Plant Genetic Engineering: Update and Teaching of Undergraduates

Organized by *Dr. Michael Torres*, N.C. State University and St. Andrews College. Sponsored by the Southeastern Section of the Botanical Society of America. This is an informal seminar with the following outline:

- I. Historical Reviews of Recombinant DNA technologies and their applications in bacterial, mammalian, and botanical systems.
- II. Review of foreign DNA uptake, integration, replication, expression, and transmission in plants.
- III. Current and future applications of gene transfer methodologies in plants.
- IV. Ideas and handouts (literature and laboratory exercises) for teaching this subject to undergraduate students.

THURSDAY MORNING, APRIL 11

Plant Ecology, Session I—KUC Room 324

Presiding: *Dr. Stewart Ware*, College of William and Mary.

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|-------|--|
| 8:30 | 1. Martin, William H. and James M. Fedders. (Eastern Kentucky University and St. Catherine College). The Establishment of Reference Plots in Treefall Gaps at Lilley Cornett Woods. |
| 8:45 | 2. Day, Frank P., Jr. (Old Dominion University). Log Decomposition in the Great Dismal Swamp. |
| 9:00 | 3. Hupp, Cliff R. (U.S. Geological Survey). Variation in Bottomland Vegetation Patterns in the Headward Direction, Northwestern Virginia. |
| 9:15 | 4. Baskin, Jerry M. and Carol C. Baskin. (University of Kentucky). Photosynthetic Pathway in Fourteen Southeastern Cedar Glade Endemics, as Revealed by Leaf Anatomy. |
| 9:30 | 5. Luvall, Jeffrey C. (Institute of Ecology, University of Georgia). Tropical Deforestation: The Effects on Evapotranspiration. |
| 9:45 | BREAK |
| 10:00 | 6. Stalter, Richard and John Serrao. (St. John's University and the Palisades Nature Association). Preliminary Growth Comparisons of Trees of the Greenbrook Sanctuary, New Jersey, 1978–1984. |
| 10:15 | 7. Ross, Jamie S. and Gene S. Van Horn. (University of Tennessee at Chattanooga). C ₄ Photosynthetic Plants of Georgia Cedar Glades. |
| 10:30 | 8. Ware, Stewart. (College of William and Mary). Re-analysis of the Original Southern Mixed Hardwood Forest Data. |
| 10:45 | 9. Pittillo, J. Dan and Hazel R. Delcourt. (Western Carolina University and the University of Tennessee). Comparison of Contemporary Vegetation and Pollen Assemblages on an Altitudinal Transect in the Balsam Mountains, Western North Carolina. |

Plant Ecology, Session II—KUC Room 324A

Presiding: *Dr. H. R. De Selm*, University of Tennessee, Knoxville.

- 8:30 10. Caithamer, David F., Alan R. Peterson, and William K. Willard. (Southern Illinois University and Tennessee Technological University). Calcium Dynamics in a Grassland Ecosystem.
- 8:45 11. McLeod, Kenneth W. (Savannah River Ecology Laboratory, University of Georgia). Thermal Ecology of *Nyssa aquatica*.
- 9:00 12. Donovan, Lisa Alayne and Kenneth W. McLeod. (Savannah River Ecology Laboratory, University of Georgia). Bald Cypress Seedling Response to Thermal and Hydrologic Regimes.
- 9:15 13. Ulaszek, Eric F. (Southern Illinois University at Carbondale). A Floristic Study of Devil's Kitchen Lake Watershed on Crab Orchard National Wildlife Refuge, Williamson and Union Counties, Illinois.
- 9:30 14. Rafaill, Barbara L. (USDA Forest Service, Northeastern Forest Experiment Station, Berea, Kentucky and Southern Illinois University at Carbondale). Establishment of Seedling Trees, Shrubs, and Woody Vines on Artificially Revegetated and Abandoned Surface Mines.
- 9:45 BREAK
- 10:00 15. Megonigal, James P. and Frank P. Day, Jr. (Old Dominion University). Organic Matter Budgets for the Great Dismal Swamp.
- 10:15 16. Sharp, Jennifer L. and Joe E. Winstead. (Western Kentucky University). Increases of Elemental Sulfur in Wood of *Quercus alba* L. from Central Tennessee and Kentucky.
- 10:30 17. Lincoln, David E. (University of South Carolina). Photosynthesis and Carbon Allocation in *Heterotheca subaxillaris* (Asteraceae) Rosettes.
- 10:45 18. De Selm, H. R. (University of Tennessee, Knoxville). Appalachian Ranges Vegetation Classification.

Plant Systematics, Session I—KUC Room 322

Presiding: *Dr. T. Lawrence Mellichamp*, University of North Carolina, Charlotte.

- 8:30 19. Werth, Charles R. (Mountain Lake Biological Station, University of Virginia). Evidence of Diploidization of Gene Expression in *Asplenium* species.
- 8:45 20. Matthews, James F. and Patricia A. Levins. (University of North Carolina at Charlotte). The Probable Introduction of *Portulaca amilis* Spegaz. into the Southeast.
- 9:00 21. Matthews, James F. and Patricia A. Levins. (University of North Carolina at Charlotte). A Scanning Electron Microscopic Analysis of the Taxonomic Characters of Seeds of *Portulaca*.
- 9:15 22. Mellichamp, T. Lawrence. (University of North Carolina at Charlotte). The Relationship of *Sarracenia* and *Nepenthes* Pitcher-plants.
- 9:30 23. Horn, Charles N. (University of Alabama). Morphology and Distribution of *Heteranthera* (sensu lato; Pontederiaceae) in the Southeastern United States.
- 9:45 BREAK
- 10:00 24. Hardin, James W. (North Carolina State University). Foliar Trichomes in American Beech.
- 10:15 25. Hardin, James W. (North Carolina State University). A Close Look at the Fruits of Sumac.
- 10:30 26. Stritch, Lawrence R. (Southern Illinois University, Carbondale). A Revision of the Leguminous Genus *Wisteria* Nuttall.
- 10:45 27. Pittman, Albert B. (Vanderbilt University). Ultraviolet Photography in Biological Systematics and Ecology.

Plant Systematics, Session II—KUC Room 322A

Presiding: *Dr. Donna M. Eggers Ware*, College of William and Mary.

- 8:30 28. Kemp, Andrew and William H. Murdy. (Emory University). Silencing of Duplicate Genes in *Talinum mengesii* Wolf (Portulacaceae).
- 8:45 29. McKinney, Landon E. (Barcon, Inc.). Preliminary Investigations into the Nature of *Viola palmata* L. and its allies.
- 9:00 30. Guthrie, Milo J. (Tennessee Native Plant Society). The Genus *Physalis* in Middle Tennessee: Some Taxonomic Problems.
- 9:15 31. Murrell, Zack E. (University of Tennessee, Knoxville). The Floristic and Phytogeographical Significance of Big Frog Mountain, Polk Co., Tennessee.
- 9:30 32. Post, Barbara J. (University of North Carolina at Charlotte). The Species Biology of *Coreopsis latifolia* Michaux.
- 9:45 BREAK
- 10:00 33. Carter, M. E. B., W. H. Murdy, and S. Summers. (Emory University). Electrophoretic Analysis of Diploid and Tetraploid *Talinum mengesii* from the Georgia Coastal Plain.
- 10:15 34. Rayner, Douglas A., Cynthia Aulbach-Smith, and South Carolina Advisory Committee. (South Carolina Wildlife and Marine Resources Department and the University of South Carolina). Rare, Threatened and Endangered Vascular Plants in South Carolina—1984 Revision.
- 10:30 35. Johnson, George P. (North Carolina State University). A Taxonomic Revision of the Chinquapin Chestnuts (*Castanea* Section *Balanocastanon*).
- 10:45 36. McDougal, Karen M. (Lenoir-Rhyne College). Chemical Characterization of Several Species of Red Oaks from the Eastern United States.

Aquatic Ecology, Session I—KUC Room 318

Presiding: *Dr. Rudolph Prins*, Western Kentucky University.

- 8:30 37. Bonner, Lisa Allen and Clay M. Chandler. (Middle Tennessee State University). Ecology of Macroinvertebrates in a Small Springbrook, Cannon County, Tennessee.
- 8:45 38. Orvos, David R., Cletus M. Sellers, Jr., and Norman E. Garrison. (James Madison University). Effect of Intermittent Chlorination Upon *in vitro* Protein Synthesis of Rainbow Trout (*Salmo gairdneri*).
- 9:00 39. Roller, Kenneth W., Cletus M. Sellers, Jr., and Gilbert S. Trelawny. (James Madison University). Effects of Intermittent Chlorination on the Plasma Amino Acid Levels of Rainbow Trout (*Salmo gairdneri*).
- 9:15 40. Williams, John M. (University of Virginia). A Mechanism for Long Distance Dispersal of Fresh Water Organisms.
- 9:30 41. Ogburn, M. Virginia. (University of North Carolina at Wilmington). A Population Survey of Gammaridean Amphipods Occurring in Sandy Estuarine Intertidal Habitats in Southeastern North Carolina.
- 9:45 BREAK
- 10:00 42. Joy, James E. and Michael Renaud. (Marshall University). A Study of Prevalence and Infection Intensity Levels for *Chaetogaster limnaei* (Annelida: Naididae) in Three Genera of Aquatic Snails from Western West Virginia.
- 10:15 43. Jovanovich, Marina C. and Ken R. Marion. (University of Alabama at Birmingham). Effects of Body Lipids, Carbohydrates, and Temperature on Uptake and Depuration of Anthracene by the Clam, *Rangia cuneata*, in Mobile Bay, Alabama.
- 10:30 44. Genter, Robert B., Donald S. Cherry, and John Cairns, Jr. (Virginia Polytechnic Institute and State University). Periphyton Population and Community Changes Due to Zinc Stress in Artificial Streams.

- 10:45 45. Sappington, Keith G., P. M. Stewart, and J. Cairns, Jr. (Virginia Polytechnic Institute and State University). Measurement of Diatom Community Changes Resulting from Various Zinc Concentrations in Laboratory Mesocosms.

Cytology-Genetics-Molecular Biology, Session I—KUC Room 305

Presiding: *Dr. Daniel W. Bath*, Austin Peay State University.

- 8:30 46. Kraus, John F. (Southeastern Forest Experiment Station, USDA, Forest Service). Inter-specific Hybridization of *Pinus echinata* × *P. taeda*.
- 8:45 47. Browne, Edward T., Jr. (Memphis State University). The Use of Trypan Blue for Determination of Plant Cell Viability.
- 9:00 48. Shaw, Rosemary G. and Dwayne A. Wise. (Mississippi State University). Chiasma Frequency and Distribution in the Wolf Spider, *Lycosa georgicola* Walkenaer.
- 9:15 49. Shull, J. Kenneth, Jr. (Appalachian State University). Ultrastructural Morphology of Chromosomes and Position of Nucleoli in Meiotic Prophase I.
- 9:30 50. Howell-Majors, Margaret, W. R. Gordon, and L. Frederick. (Howard University). A Comparative Study of Protein Profiles of Isolates of a Natural Mutant of *Neurospora dodgei*.
- 9:45 BREAK
- 10:00 51. Wilfred, Antonia, L. Frederick, and W. Lena Austin. (Howard University). Observations on the Nuclear Behavior During Ascosporeogenesis in a Natural Mutant of *Neurospora dodgei*.
- 10:15 52. Holland, John W., III and Mary L. Reyes. (Middle Tennessee State University). The Effects of Cadmium on *in vitro* Mitogen Activity of Murine Spleenocytes in a Primary Immune Response.
- 10:30 53. Blocker, Kay and Mary L. Reyes. (Middle Tennessee State University). Substitution of a 2-Mercaptoethanol Treated Antigen for Macrophages to Elicit a Primary Immune Response.
- 10:45 54. Ryals, Phillip E. (The University of Alabama). Iron(III), Alpha-Tocopheryl Succinate, and Low-Transforming Sublines of *Tetrahymena vorax*.

Plant Physiology, Session I—KUC Room 316

Presiding: *Dr. Robert Creek*, Eastern Kentucky University.

- 9:30 55. Reynolds, Thomas L. (University of North Carolina at Charlotte). Chlorsulfuron Inhibition of Spore Germination in the Fern, *Pteridium aquilinum* and Its Reversal by Iso-leucine and Valine.
- 9:45 56. Reynolds, Thomas L. (University of North Carolina at Charlotte). Morphogenesis of Pollen Callus Cultures of *Solanum carolinense*.
- 10:00 57. Stumpff, Nancy J. and Jon D. Johnson. (Virginia Polytechnic Institute and State University). Ethylene Production by Loblolly Pine Seedlings in Response to Water Stress.
- 10:15 58. Creek, Robert and Gary L. Wade. (Eastern Kentucky University and Northeastern Forest Experiment Station). Excretion of Phenolic Compounds from the Roots of *Festuca arundinacea*, *Eragrostis curvula*, and *Lespedeza striata*.

Cryptogamic Botany, Session I—KUC Room 313

Presiding: *Dr. Dean Whittier*, Vanderbilt University.

- 9:30 59. Whittier, Dean P. (Vanderbilt University). Underground Gametophytes of the Ferns and Fern Allies.

- 9:45 60. Wallace, James W. and Hu Zhihao. (Western Carolina University and Yunnan University, China). The Biflavone Enigma Relating to the Origin of Leptosporangiate Ferns.
- 10:00 61. Hardy, Mark G. and J. Charles O'Kelley. (The University of Alabama). Nitrogen and the Sexual Cycle in *Neosporangium* sp.
- 10:15 62. Doyle, Michael F. (Southern Illinois University at Carbondale). The Genus *Crinipellis* Pat. in Illinois.
- 10:30 63. Bartholomew, Sharon E. (East Tennessee State University). Sporeling Development Within the Metzgeriales (Hepatophyta).
- 10:45 64. Renzaglia, Karen S. and Chic-Mei Chin. (East Tennessee State University). Factors Affecting the Sexuality and Growth of *Fossombronia brasiliensis* Steph.

THURSDAY AFTERNOON, APRIL 11

Symposium I—KUC Room 324 and 324A Biota, Ecology and Ecological History of Cedar Glades

Co-sponsored by the Southeastern Chapter of the Ecological Society of America and the Association of Southeastern Biologists.

Presiding: *Dr. Paul Somers*, Tennessee Department of Conservation

- 1:30 65. Quarterman, Elsie. (Vanderbilt University). Introduction.
- 1:40 66. Baskin, Jerry M. and Carol C. Baskin. (University of Kentucky). Geographical Distribution of the Southeastern Cedar Glade Endemics.
- 2:00 67. Bridges, Edwin L. (Tennessee Department of Conservation). Distribution Patterns of the Non-Endemic Flora of the Limestone Glades of Middle Tennessee.
- 2:20 68. Jordan, O. Ray. (Tennessee Technological University). Herpetofauna of the Cedar Glades.
- 2:35 BREAK
- 2:50 69. Delcourt, Hazel R., Paul A. Delcourt, Gary R. Wilkins, E. Newman Smith, Jr., and Peter S. Larabee. (University of Tennessee). Vegetational History of the Cedar Glades Regions of Tennessee, Kentucky, and Missouri During the Past 30,000 Years.
- 3:05 70. Klippel, Walter E. (University of Tennessee). Diachronic Variation in Mammal Faunas from the Central Basin of Middle Tennessee.
- 3:25 71. Parmalee, Paul W. (University of Tennessee). Contrasting Late Pleistocene–Early Holocene Avifaunas in the Nashville Basin.
- 3:40 BREAK
- 4:00 72. Crites, Gary D. and Edward E. C. Clebsch. (University of Tennessee). Woody Vegetation in the Inner Nashville Basin: An Example from the Cheek Bend Area of the Central Duck River Valley.
- 4:20 73. Smith, Larry, Paul Somers, Edwin L. Bridges, and Paul B. Hamel. (Tennessee Department of Conservation). Preliminary Analysis of Seasonal Change in Middle Tennessee Cedar Glade Plant Communities.
- 4:40 74. Hemmerly, Thomas E. (Middle Tennessee State University). Life Cycle Strategy of a Highly Endemic Cedar Glade Species: *Echinacea tennesseensis*.
- 5:00 75. Eickmeier, William G. (Vanderbilt University). Photosynthetic Diversity in Cedar Glade Plants.

Ichthyology and Herpetology, Session I—KUC 322

Presiding: *Dr. Floyd Scott*, Austin Peay State University.

- 1:30 76. Mulligan, Timothy J. and F. Douglas Martin. (University of Maryland, Chesapeake Biological Laboratory). Identification of White Perch (*Morone americana*) Stocks Based on Elemental Composition of Otoliths.

- 1:45 77. Lee, David S. and Brooks M. Burr. (North Carolina State Museum and Southern Illinois University at Carbondale). Observations on Life History of the Dollar Sunfish, *Lepomis marginatus* (Holbrook).
- 2:00 78. Chandler, Clay M. and George G. Murphy. (Middle Tennessee State University). Hermaphroditism in *Rana catesbeiana*.
- 2:15 79. Young, Robert¹ and S. Niemeier.² (University of Mississippi¹ and Johnson County Community College²). Characterization of Venoms from Opisthoglyphous Snakes.
- 2:30 BREAK
- 3:00 80. O'Bara, Christopher J. and D. LaDon Swann. (Tennessee Tech University). Small Stream Fishes of the Upper Cumberland River Drainage, Kentucky and Tennessee.
- 3:15 81. Johnson, Amanda R. and Ken R. Marion. (University of Alabama in Birmingham). Environmental Correlates with Population Sizes of the Flattened Musk Turtle, *Sternotherus depressus*.
- 3:30 82. Reed, Kimberly J. and George G. Murphy. (Middle Tennessee State University). Toxicity of Eggs of the American Toad, *Bufo americanus*.

Ichthyology and Herpetology, Session II—KUC Room 322A

Presiding: Dr. Lee A. Barclay, Jr., Tennessee Technological University and U.S. Fish and Wildlife Service.

- 1:30 83. Thibaudeau, Giselle and Ronald Altig. (Mississippi State University). Yolk Crystals of Amphibians.
- 1:45 84. Asquith, Adam. (Mississippi State University). Osmoregulation of *Siren intermedia*.
- 2:00 85. Oetinger, Lyonabab and Adam Asquith. (Mississippi State University). Behavior Patterns of *Siren intermedia*.
- 2:15 86. McKee, Douglas M. (Middle Tennessee State University). Preliminary Survey of the Fishes of the Upper Stones River, Tennessee.
- 2:30 BREAK
- 3:00 87. Angus, Robert A. (University of Alabama in Birmingham). Fluctuating Asymmetry in Pure vs. Intergrade Mosquitofish Populations.
- 3:15 88. Adkins, M. Dale, Michael L. Little, Jeff Lyons, James A. Meadows, Donald C. Tarter, Randy D. Taylor, and Barry Wyant. (Marshall University). Electrophoretic Analysis of Blacknose Dace, *Rhinichthys atratulus*, in Two Streams in West Virginia.
- 3:30 89. Hally, Moira K. (Western Carolina University). Genome Sizes and Growth Rates of Three *Desmognathus* Salamanders.

Aquatic Ecology, Session II—KUC Room 318

Presiding: Dr. Charles N. Boehms, Austin Peay State University.

- 1:30 90. Johnson, Dan M. (East Tennessee State University). Prey Resource Depletion by Larval Odonata.
- 1:45 91. Meadows, James A. (Marshall University). Ecological Assessment of Benthic Macroinvertebrates in the Cranberry River, Pocahontas County, West Virginia.
- 2:00 92. Allen, Beverly L. and Donald C. Tarter. (Sue Bennett College and Marshall University). Life History and Ecology of *Eccopectura xanthenes* (Newman) (Plecoptera: Perlidae) from a Small Kentucky Stream.
- 2:15 93. Shah, Jayshree and T. E. Weak. (Marshall University). Growth Potential of *Spirulina major* in Limestone Quarry Water.
- 2:30 94. Malcomb, C. Dale, Randy D. Taylor, and Donald C. Tarter. (Marshall University). The Use of STORET and the National Sanitation Foundation's Water Quality Index to Develop a Regionally Adaptable Index of Water Quality.

- 2:45 BREAK
- 3:15 95. Schmidt, Denise A. and Donald C. Tarter. (Marshall University). The Life History and Ecology of *Acronyria carolinensis* (Banks) (Plecoptera: Perlidae) in Panther Creek, Nicholas County, West Virginia.
- 3:30 96. Cooper, Charles M.¹ and Luther A. Knight, Jr.² (USDA-ARS Sedimentation Lab¹ and University of Mississippi²). Coliform Levels in Moon Lake, Mississippi.
- 3:45 97. Strohmeier, Kevin L. (University of Kentucky). Newt Predation and Invertebrate Community Structure in a Natural Pond Ecosystem.
- 4:00 98. Shaffer, Gary P. and Peter Cahoon. (Louisiana State University and University of British Columbia). Extracting Information from Ecosystems Containing High Spatial and Temporal Variability: Benthic Microfloral Productivity.

Parasitology, Session I—KUC Room 316

Presiding: *Dr. Sharon Patton*, University of Tennessee, Knoxville.

- 1:30 99. Bogitsh, B. J., R. K. Barrett, and I. Y. Marshall. (Vanderbilt University). Further Observations on the Acid Proteases of *Schistosoma japonicum*.
- 1:45 100. Stuart, Michael D. and Grover C. Miller. (North Carolina State University). *Oswaldocruzia* sp. from the Box Turtle in North Carolina.
- 2:00 101. Patton, Sharon, J. M. Jensen, D. G. Loeffler, B. G. Wright, and S. L. Strawbridge. (University of Tennessee College of Veterinary Medicine). Transmission and Consequences of Toxoplasmosis in Captive Wild Animals at the Knoxville Zoological Park.
- 2:15 102. Strawbridge, S. L., Sharon Patton, M. D. McCracken, S. R. Randolph, and T. Roberson. (University of Tennessee College of Veterinary Medicine). A Survey of the Parasites of Cats in Knoxville, Tennessee.
- 2:30 103. Joy, James E. and Edward A. Gastineau. (Marshall University). Larval Trematodes from the Aquatic Snail, *Helisoma antrosa*, in Mason County, West Virginia.

Invertebrate Zoology, Session I—KUC Room 305

Presiding: *Dr. Charles H. Nelson*, University of Tennessee, Chattanooga.

- 1:30 104. Nelson, Charles H. (University of Tennessee, Chattanooga). Numerical Cladistic Analysis of Phylogenetic Relationships in the Family Pteronareyidae (Insecta: Plecoptera).
- 1:45 105. Grimm, J. K. and J. L. Grimm. (James Madison University and Page County High School). A Study of the Correlation Between Songbird Nests and the Insect Fauna Found in the Nests.
- 2:00 106. Garcia, Julia. (University of New Orleans). Slugs as Important Economic Pests in Central America.
- 2:15 107. Ciolino, Jane. (University of New Orleans). *Helix pomatia* and *H. aspersa*—Can Snails Be Raised in Captivity for the Commercial Market?
- 2:30 108. Joy, James E. (Marshall University). Long Term Growth Study on the Asiatic Clam, *Corbicula fluminea* (Müller), from the Kanawha River, West Virginia.
- 2:45 BREAK
- 3:15 109. Korgi, Alberto J., Christopher J. O'Bara and R. Don Estes. (Tennessee Technological University). Distribution of Crayfish in Two Physiographic Regions of the Cumberland River Drainage.
- 3:30 110. Upadhyay, J., Michael J. Sehurr, and Roland J. Lesseps. (Loyola University). Phase Contrast and Scanning Electron Microscopy of a Soil Amoeba, *Hartmannella glebae*.
- 3:45 111. Murphree, Charles S. (Middle Tennessee State University). Micromorphological Features of Selected Phalangid Species (Arachnida: Phalangida (Opiliones)).
- 4:00 112. Wells, Marion R. and Clay M. Chandler. (Middle Tennessee State University). Scanning Electron Microscopy of the Cuticle of *Chordodes morgani*.

- 4:15 113. Nelson, D. R., C. J. Kincer, and T. C. Williams. (East Tennessee State University). Effect of Habitat Disturbance on Aquatic Tardigrade Populations.

Animal Physiology, Session I—KUC Room 313

Presiding: *Dr. Floyd Ford*, Austin Peay State University.

- 1:30 114. Stell, Phyllis and William Crowley. (Memphis State University and University of Tennessee Center for Health Sciences). Prolactin Release in the Female Rat Following Food Intake.
- 1:45 115. Lamoreaux, William J. and Priscilla S. Rushton. (Memphis State University). The Circadian Rhythm of Transferrin in *Mus musculus* and the Effect of Food Versus Photoperiod Entrainment.

FRIDAY MORNING, APRIL 12

Symposium II—KUC Room 324 and 324A Demographic Studies of Rare Plant Species

Sponsored by the Association of Southeastern Biologists Conservation Committee. Organized by *Robert D. Sutter*, Plant Conservation Program, Raleigh, NC.

Presiding: *Robert D. Sutter*.

- 7:55 Introduction.
- 8:05 116. Cook, Robert Edward. (Cornell Plantations, Cornell University). Plant Demography and the Recovery of Endangered Plant Species.
- 8:30 117. Travis, Joseph. (Florida State University). Statistical Problems in Studying the Demography of Rare Plant Species.
- 8:55 118. Baskin, Carol C. and Jerry M. Baskin. (University of Kentucky). Temporal Aspects of Seed Dispersal and Germination.
- 9:20 119. Sutter, Robert D. (North Carolina Department of Agriculture, Plant Conservation Program). Prioritization and Interpretation of Demographic Research on Rare and Endangered Plant Species.
- 9:35 BREAK
- 9:50 120. Palmer, Mary E. (North Carolina Department of Agriculture, Plant Conservation Program). Assessment of the Types of Monitoring in Rare Plant Species and Communities: Programs and Methods.
- 10:05 121. Morgan, Sharon W. (Missouri Department of Conservation). Rare Plant Monitoring in Missouri.
- 10:20 122. Somers, Paul. (Tennessee Department of Conservation). Monitoring Rare Plant Populations in Tennessee.
- 10:35 123. Rankin, W. T. and S. T. A. Pickett. (Rutgers University). The Demography of *Buchnera americana*.
- 11:00 124. Bowles, Marlin L.,¹ Randy Nyboer,² Marcella De Mauro,³ and Mark Racicot.⁴ (The Morton Arboretum,¹ Illinois Department of Conservation,² University of Illinois at Chicago,³ and Will County Forest Preserve District⁴). *Astragalus tennesseensis* and *Petalostemum foliosum* in Illinois: Observations on Their Distribution, Ecology, and Management.

Animal Ecology, Session I—KUC Room 322

Presiding: *Dr. Mark W. LaSalle*, University of North Carolina, Wilmington.

- 8:00 125. Jackson, James F. (University of Southwestern Louisiana). A Model for Adaptive Ontogenetic Patterning of Investment in Defensive Structures.

- 8:15 126. LaSalle, Mark W. and Armando A. de la Cruz. (University of North Carolina at Wilmington and Mississippi State University). Seasonal Abundance and Diversity of Spiders in Two Marsh Plant Communities in Mississippi.
- 8:30 127. LaSalle, Mark W. (University of North Carolina at Wilmington). Separating Juveniles of Similar Looking Spider Species: Application to Ecological Studies.
- 8:45 128. Hackney, Courtney T. (University of North Carolina at Wilmington). Variations of Shell Morphology in the Carolina Marsh Clam, *Polymesoda caroliniana* (Bosc) Related to Geography.
- 9:00 BREAK
- 9:30 129. Reed, Samuel M., III. (Middle Tennessee State University). A Reproductive Study of the White-Tailed Deer, *Odocoileus virginianus*, at the Arnold Engineering Development Center, Coffee County, Tennessee.
- 9:45 130. Pechmann, Joseph H. K. and Raymond D. Semlitsch. (Savannah River Ecology Laboratory). Diel Activity Patterns in the Breeding Migrations of Four Winter-Breeding Anurans.
- 10:00 131. Pinder, John E., III¹ and Glenn C. Kroh.² (Savannah River Ecology Laboratory¹ and Texas Christian University²). Insect Herbivory and Photosynthetic Pathways in South Carolina Old Fields.
- 10:15 132. Jackson, Patrick R.¹ and John E. Pinder, III.² (Paine College¹ and Savannah River Ecology Laboratory²). Comparisons of Orthopteran Species Abundances Through Thirty Years of Plant Succession.
- 10:30 133. Mills, Edward D. and J. Frank Randall. (Appalachian State University). Nest Distribution of Birds in Christmas Tree Plantations of *Abies fraseri* and *Pinus strobus*.

Developmental Biology, Session I—KUC Room 318

Presiding: *Dr. James J. Friauf*, Vanderbilt University.

- 9:00 134. Pories, Walter J., Robert H. Maier, Prem P. Sehgal, and Steven P. VanCleave. (Department of Surgery, School of Medicine and Department of Biology, East Carolina University). Effects of Selenium on Soybean Callus.
- 9:15 135. March, Roslyn A.,¹ David L. Bramlett,² William V. Dashek,¹ and John E. Mayfield.¹ (Atlanta University¹ and The Southeastern Forest Experiment Station²). The Timing of Fertilization in *Pinus taeda*.

Teaching, Session I—KUC Room 316

Presiding: *Dr. Frank R. Toman*, Western Kentucky University.

- 9:00 136. Toman, Frank R. (Western Kentucky University). A Laboratory Exercise Combining an Enzyme Assay (RUBPCase) with Radioactive Isotope Techniques.
- 9:15 137. Coffee, Janice C. (St. Mary's College). Laboratory Activities in Environmental Biology Courses.

FRIDAY AFTERNOON, APRIL 12

Symposium on Rare Plants, Continued—KUC Room 324, 324A

1:30–2:30 Round Table Discussion. *Robert D. Sutter*, Presiding.

Plant Systematics, Session III—KUC Room 316

Presiding: *Dr. Robert L. Beckmann*, North Carolina State University.

- 2:30 138. Carter, Richard. (Valdosta State College). Lectotypification of *Scirpus echinatus* L.
- 2:45 139. Johnson, George P. and R. L. Beckmann. (North Carolina State University). The Foliar Flavonoids of North American *Castanea*.

- 3:00 140. Bounds, R. R., R. L. Beckmann, and C. G. Van Dyke. (North Carolina State University). Taxonomic Implications of Seed and Pollen Morphology in *Rhexia* spp.
- 3:15 141. Douglass, Caroline C., Robert E. Ballard, and Alston E. Hodge. (Clemson University). Flavonoid Chemistry and Chromosome Numbers in the Southeastern Species of *Waldsteinia* Willd. (Rosaceae).
- 3:30 142. Fairey, John E., III, Caroline C. Douglass, and David W. Bradshaw. (Clemson University). Preliminary Observations on Transplants from the Basin of the Richard B. Russell Lake.
- 3:45 143. Maloney, Ann C. and Dan K. Evans. (Marshall University). A Taxonomic Study of Local Populations of *Carex jamesii* Schweinitz and *Carex willdenowii* Schkuhr (*Phyllostachyae*: Cyperaceae) in the Ohio River Valley.

Plant Ecology, Session III—KUC Room 322

Presiding: *Dr. Rebecca Sharitz*, Savannah River Ecology Laboratory.

- 2:30 144. Presmyk, Catherine J. (Southern Illinois University at Carbondale). The Effect of Wildfire and Clearcutting on Woody Species Regeneration in the Ozark Hills of Southern Illinois.
- 2:45 145. Conner, William H. (Louisiana State University). Natural Regeneration in a Louisiana Swamp.
- 3:00 146. Feil, Elisabeth G. (University of North Carolina at Charlotte). Vegetation of Chimney Rock Park, Rutherford County, North Carolina.
- 3:15 147. Carter, M. Eloise Brown. (Emory University). Differential Production of Asexual Propagules in *Talinum mengesii* and *T. teretifolium*.
- 3:30 148. MacKenzie, Mark D. and Paul A. Delcourt. (University of Tennessee). An Analysis of Present Forest Composition in Eastern North America Based on Continuous Forest Inventory Data.
- 3:45 BREAK
- 4:00 149. McDearman, Will W. (Mississippi Museum of Natural Science). Nectar Production and Pollinator Foraging Response in *Zigadenus glaberrimus*.
- 4:15 150. Busing, Richard T. and Edward E. C. Clebsch. (University of Tennessee). Canopy-Understory Interactions in a Southern Appalachian Spruce-Fir Forest.
- 4:30 151. Busing, Richard T. and Edward E. C. Clebsch. (University of Tennessee). Development and Application of a Southern Appalachian Spruce-Fir Forest Succession Model.
- 4:45 152. Day, Andrew J., Michael L. Scott, and Rebecca R. Sharitz. (Savannah River Ecology Laboratory). Herbaceous Biomass and Stem Density Differences Along a Thermal Gradient in a Cypress (*Taxodium distichum* L.)-Tupelo (*Nyssa aquatica* L.) Wetland.
- 5:00 153. Scott, Michael L., Jacqueline L. Haskins, and Rebecca R. Sharitz. (Savannah River Ecology Laboratory). Density, Biomass and Patterns of Mortality of Cypress (*Taxodium distichum* L.) Knees in a Thermally Disturbed Swamp.

Plant Ecology, Session IV—KUC Room 322A

Presiding: *Dr. Cliff R. Hupp*, U.S. Geological Survey.

- 2:30 154. Muzika, R. M.,¹ J. B. Gladden,² J. D. Haddock,¹ and D. M. Waters.¹ (Savannah River Ecology Laboratory¹ and Savannah River Laboratory²). Wood Production in Wetland Tree Species.
- 2:45 155. Mitchell, Claudia E.,¹ George T. Weaver,² and Philip A. Robertson.² (Savannah River Ecology Laboratory¹ and Southern Illinois University at Carbondale²). Changes in Calcium Levels in Foliage, Stems and Roots During Autumnal Leaf Senescence of *Quercus prinus* L. Grown Under Two Soil Moisture and Calcium Regimes.
- 3:00 156. Schneider, Rebecca L. and Rebecca R. Sharitz. (Savannah River Ecology Laboratory). Soil Seed Banks in a Southeastern Palustrine Wetland.

- 3:15 157. Pinder, John E., III, Alice C. Doswell, Domy C. Adriano, Thomas G. Ciravolo, and Donald M. Yehling. (Savannah River Ecology Laboratory). The Interception, Retention and Redistribution of Pu-238 Deposition in the Canopy of Orange Trees.
- 3:30 158. Hodge, Alston E. (Clemson University). Ecological Characterization of Herbaceous Dominated Carolina Bays of the Upper Coastal Plain of South Carolina.
- 3:45 BREAK
- 4:00 159. Kovacic, David A. and Jack S. Erwin. (Savannah River Ecology Laboratory). Mineralization and Nitrification Potentials of Coastal Plain Forest Habitats Along a Moisture Gradient.
- 4:15 160. Osborn, T. R., C. E. Sasser, and J. G. Gosselink. (Louisiana State University). The Measurement of Diversity in Louisiana Marshes.
- 4:30 161. de la Cruz, A. A.,¹ E. D. Gomez,² D. H. Miles,¹ G. B. Cajipe,¹ and V. B. Chavez.² (Mississippi State University¹ and University of the Philippines²). Toxicants from Mangrove Plants: I. Bioassay of Crude Extracts.
- 4:45 162. Woods, Michael. (Southern Illinois University at Carbondale). The Vascular Flora of Calloway County, Kentucky.
- 5:00 163. Patrick, Thomas S. and H. R. DeSelm. (University of Tennessee, Knoxville). Floristics of an East Tennessee Cedar Barren.

Cryptogamic Botany, Session II—KUC Room 318

Presiding: *Dr. L. Frederick*, Howard University.

- 2:30 164. Taylor, Rosannah,¹ William V. Dashek,¹ Walter C. Shortle,² and John E. Mayfield.² (Atlanta University¹ and The Northeastern Forest Experiment Station²). Polyphenol Oxidase in *Coriolus versicolor*.
- 2:45 165. Tawila, Salem,¹ William V. Dashek,¹ Walter C. Shortle,² and John E. Mayfield.¹ (Atlanta University¹ and The Northeastern Forest Experiment Station²). Effects of Catechol on the Ultrastructure of *Poria obliqua* and *Phialophora melinii*.
- 3:00 166. Frederick, L.,¹ Ivan L. Roth,² and Levester Pendergrass.³ (Howard University,¹ University of Georgia,² and U.S. Forest Service, Range Timber and Wildlife Division³). Studies on the Nature of the "Peridial Platelets" of *Clastoderma debaryanum* Sporangia.
- 3:15 167. Reese, William Dean. (University of Southwestern Louisiana). Tropical Lowland Mosses (Musci) Disjunct Between Africa and the Americas.
- 3:30 168. Sundberg, Walter J. (Department of Botany, Southern Illinois University at Carbondale). An Unusual Ultrastructural Modification in the Nuclear Envelope of *Mycena citricolor* (Tricholomataceae, Agaricales).

Abstracts

1

MARTIN, WILLIAM H. and JAMES M. FEDDERS. Eastern Kentucky University, and St. Catherine College--The establishment of reference plots in treefall gaps at Lilley Cornett Woods.

In June, 1983, a thunderstorm created several large canopy gaps at Lilley Cornett Woods in southeastern Kentucky. In 1984, 0.25 ha permanent plots were established in the affected area as part of a research program that concentrates on the structure and dynamics of this old-growth mixed mesophytic forest. Initial reference plot data included all trees ≥ 5.0 cm dbh recorded by species and measured to nearest 0.1 cm dbh in 50 x 50 m plots; selected bole and crown conditions were also recorded. In nested plots, smaller trees and shrubs were recorded by species and those ≤ 1 m in height were placed in age classes of ≤ 1 year or > 1 year. Plots were divided into 10 x 10 m grid and all standing trees > 5.0 cm dbh were mapped and tagged; stumps, snags and down trees were also mapped. The establishment of reference plots in openings and in closed canopy habitats will be of value in the formulation and evaluation of hypotheses that address the effects of gap formation on forest microclimate, plant and animal populations and communities through time. Periodic measurements at these permanent, identifiable sites will provide a more accurate assessment of forest dynamics than information from similar communities arranged in a time sequence on the basis of relative differences in development.

2

DAY, FRANK P. Old Dominion University--Log decomposition in the Great Dismal Swamp.

Mass loss and nutrient dynamics are being monitored in preweighed red maple logs which were set-out fresh on four sites with different hydro periods. In three years, logs have decayed fastest (65% mass loss) on the maple-gum site, which exhibits highly variable flooding, and slowest (42% mass loss) on the cypress site which is continuously flooded for several months during the year. Decomposition on the maple-gum site was much more rapid than expected. A possible reason for such rapid decay is that optimum moisture conditions for decay organisms exist, as the area stays wet much of the year but is not continuously flooded for long periods. Logs on the maple-gum site had abundant bracket fungi in evidence on their exteriors.

3

HUPP, CLIFF R., U.S. Geological Survey, 431 National Center, Reston, Virginia 22092--Variation in bottomland vegetation patterns in the headward direction, northwestern Virginia.

Discrete patterns of vegetation related to fluvial landforms have been observed along many perennial streams in Virginia. However, variation in these patterns in the headward (upstream) direction has received little study, and the controlling factors are poorly understood. The relations between stream gradient, basin area, stream order, and the headward extent of fluvial landforms and vegetation was studied in 18 small basins and larger nearby stream reaches in the Massanutten Mountain area of northern Shenandoah Valley, Virginia. Low-order streams were traversed, upvalley, to their basin heads and the location of the point or region where discrete fluvial landforms and associated bottomland or riparian vegetation disappears were noted. These landforms include channel bars, channel shelves, flood plains, and terraces. Basin morphometric characteristics were determined from topographic and geologic maps. Stream gradient appears to be the most important factor associated with the development of fluvial landforms, and thus, the distribution of bottomland vegetation. Flood plains have not developed along stream reaches where channel gradients exceeded an average gradient of 0.15. Flood plains are not present as far upstream as channel shelves and associated vegetation.

4

BASKIN, JERRY M. and CAROL C. BASKIN. University of Kentucky--Photosynthetic pathway in fourteen southeastern cedar glade endemics, as revealed by leaf anatomy.

Cross sections of leaves of 14 of the 26 plant taxa endemic to cedar (limestone) glades of southeastern United States were examined for presence or absence of Kranz anatomy. All 14 taxa are non-Kranz, indicating that they fix carbon via the C_3 pathway of photosynthesis. Based on what is known about the types of photoynthesis (C_3 , C_4 , CAM) in genera to which the other 12 endemic taxa belong and on the fact that eight of them are winter annuals, it is highly probable that all 26 taxa are C_3 plants. Further, it appears that approximately 95% of the ca. 90 taxa endemic to (unshaded) rock outcrop plant communities of unglaciated eastern United States use the C_3 pathway. Thus, the C_4 pathway is not required for adaptation to the hot, dry, high-light environment of the rock outcrops.

5

LUVALL, JEFFREY C. Institute of Ecology, University of Georgia--Tropical deforestation: The effects on evapotranspiration.

A 50 x 50 meter plot of mature primary tropical rain forest in Costa Rica was clear-cut to study the effects of deforestation on the evapotranspiration (ET) process. Daily evapotranspiration was measured using the Penman-Monteith equation from August 1982 to March 1983 for a secondary and primary forest. After cutting measurements were taken from the control forest (primary forest) and the cut area from March 1983 to August 1983. ET for the primary forest averaged 0.59 cm day⁻¹, for the secondary forest, 0.47 cm day⁻¹ and the cut area 0.38 cm day⁻¹. These differences are significant ($P=0.001$). After 160 days of recovery, soil evaporation was still 23% of the total water loss from the cut area. Recovery of ET followed an increase in leaf area during regrowth. Intercepted water in the primary forest accounted for about 35% of the total water loss and transpiration about 65%.

6

STALTER, RICHARD¹ and JOHN SERRAO². St. John's University and Palisades Nature Association, Alpine, New Jersey²--Preliminary growth comparisons of trees of the Greenbrook Sanctuary, New Jersey, 1978-1984.

Measurements of height and circumference at breast height of 32 species of trees at the Greenbrook Sanctuary, Bergen County, New Jersey, were compared over a six year period, 1978-1984. The Greenbrook Sanctuary contains many large trees that are over 200 years old. Comparisons of Pinus strobus, Tsuga canadensis, Salix nigra, S. alba, Populus deltoides, P. grandidentata, Juglans cinerea, Carya ovata, C. tomentosa, C. glabra, C. cordiformis, Ostrya virginiana, Carpinus caroliniana, Betula lenta, B. lutea, B. populifolia, Fagus grandifolia, Castanea dentata, Quercus alba, Q. prinus, Q. bicolor, Q. rubra, Q. palustris, Q. coccinea, Q. velutina, Ulmus rubra, U. americana, Celtis occidentalis, Liriodendron tulipifera, Sassafras albidum, Liquidambar styraciflua, and Platanus occidentalis are presented. Different species exhibit pronounced differences in growth rates. Age, competition, site differences, differential predation by the gypsy moth (1979-1981) and differences in hereditary material might account for variation in inter and intra-specific growth rates.

7

ROSS, JAMIE S. and GENE S. VAN HORN. University of Tennessee at Chattanooga--C₄ photosynthetic plants of Georgia cedar glades.

Plant species with C₄ photosynthesis are expected in arid habitats but little work has been done to establish their frequency in the eastern U.S. Leaf sections of 65 species of northwest Georgia cedar glade plants were sectioned and stained with I₂KI in order to determine the relative number of species with C₄ photosynthesis. Annual and perennial plants were examined. Eight species have Kranz anatomy, thus indicating C₄ photosynthesis. Some of the species have not been previously reported as having C₄ photosynthesis. The low number of cedar glade plants with C₄ photosynthesis is not surprising in view of the high rainfall in northwest Georgia. Nonetheless, the presence of some C₄ species was expected because the shallow soil of cedar glades becomes dry soon after rains if sunny conditions prevail and because some C₄ species were found in Kentucky cedar glades (Baskin and Baskin, 1980). The cedar glade species with C₄ photosynthesis all have broad distributions, with the smallest distribution encompassing the southeastern U.S. and the largest distribution extending across most of the U.S. Thus, none of the C₄ species are endemic to cedar glades, but C₄ species can exploit the cedar glade habitat. No plant species in the wooded area around the cedar glades are known to have C₄ photosynthesis.

8

WARE, STEWART. College of William & Mary--Reanalysis of the original Southern Mixed Hardwood Forest data.

In their original SMHF study Quarterman & Keever found almost no relationship between occurrence of species and environmental factors or among species. However, presence of varying amounts of successional Pinus taeda obscured vegetational relationships. Using Importance Value rather than occurrence and ignoring P. taeda completely, one can arrange the original SMHF stands in a vegetational gradient with the I.V. peaks in the order Carya tomentosa, Quercus alba, Fagus grandifolia, Magnolia grandiflora, Q. laurifolia, & Liquidambar styraciflua, though the last species, like Q. falcata and C. glabra, had high I.V. scattered all across the gradient. Despite the neatness of the gradient, it does not correlate with any of the measured variables (moisture class, soil texture, pH, K, P, NO₃). Some individual taxa did show high I.V. in the higher moisture classes either less frequently (Q. laurifolia) or more frequently (Tilia spp., Pinus glabra, Q. alba) than expected by chance alone. The environmental factors controlling this gradient are apparently not among the ones measured. E. Quarterman and C. Keever are thanked for making their original data available for reanalysis.

PITTILO, J. DAN and HAZEL R. DELCOURT. Western Carolina University and University of Tennessee--Comparison of contemporary vegetation and pollen assemblages on an altitudinal transect in the Balsam Mountains, western North Carolina.

Interpretation of late-Quaternary vegetation history from sediment deposits of wetlands or lakes is facilitated by comparing existing vegetation with pollen deposition beneath it. Collections of paired vegetation plots (10x10m) with included pollen samples (from moss polsters) were made at 92.5m elevational intervals between 610 and 1860m elevation along the Blue Ridge Parkway southwest of Asheville, N.C. The vegetation was grouped into six types: 1) flood plain forest, 2) mesic oak forest, 3) xeric oak forest, 4) cove forest, 5) yellow-birch boulderfields, and 6) spruce-fir forest. Pollen assemblages were found to accurately reflect the vegetation cover type. Quercus, Betula, Fagus, Abies, and Picea showed good correlation of percent pollen and percent cover. Certain pollen types were found restricted with local deposition (Halesia), some were extra-local and a little wider distributed (Abies), some were regional and distributed up to 10km from their origin (Pinus), and some were transported from outside the region (Liquidambar).

CAITHAMER, DAVID F.,¹ ALAN R. PETERSON,² and WILLIAM K. WILLARD.² Southern Illinois University¹ and Tennessee Technological University²--Calcium dynamics in a grassland ecosystem.

Biomass and calcium concentrations taken monthly during 1982-83 showed trends which, in most cases, were clearly interdependent and reflected the action of vegetational and faunal growth and decay processes. The soil, plant, and leaf litter components were respectively, each directly involved with 99.2, 50.2, and 49.0% of the total annual calcium movement. Fescue accounted for 80% of the plant biomass on an annual basis while lespedeza and forbs accounted for 20%. The average calcium concentration for producers ranged from 2.4 mg/g dry wt in January to 9.5 mg/g dry wt in September and averaged annually 5.3 mg/g dry wt. Litter calcium followed a similar trend as litter biomass and averaged annually 9.3 mg/g dry wt. The rate of calcium loss from leaf litter was 7.4%/mo and approximated the rate of mass loss (7.1%/mo) in litter bags. Arthropods were only directly involved with 1.6% of the total annual calcium movement. Detritivores represented 57% of the total arthropod biomass in winter and acted as a calcium sink. Meadowlarks represented only 0.001% of the total grassland calcium (excluding soil). The total flux rate of calcium was 14 g/m²/yr for the ecosystem and 201 mg/m²/yr for consumer compartments.

MCLEOD, KENNETH W. Savannah River Ecology Laboratory--Thermal Ecology of *Nyssa aquatic*.

Differing species specific responses to environmental variables are common and frequently utilized to explain the distribution of a species. Some species have unexpected resistances to unique human disturbances, such as cooling water effluents from nuclear production reactors. In an effort to explain the response of the swamp forest species to this type of disturbance, several studies, ranging from laboratory to microcosm and field, have demonstrated that *Nyssa aquatica* L., water tupelo, is negatively affected by both thermal and flooding conditions, especially in the combination of a hot flooded environment. Germination rates, growth, photosynthetic rates, biomass and survivorship all decline primarily in response to increasing water temperature, and also, but to a lesser extent to respond to increased inundation depth. This is in contrast to other species previously investigated, which have tended to have a higher thermal tolerance and even increased growth in response to moderate temperature increases. All species have temperature optima and maxima for growth and survival. These appear to be lower for water tupelo, which can explain their demise and lack of regeneration in cooling water effected swamp forest.

DONOVAN, LISA A. and KENNETH W. MCLEOD. Savannah River Ecology Laboratory--Bald Cypress seedling response to thermal and hydrologic regimes.

Cooling water effluent from nuclear production reactors produced lethal conditions in streams and contiguous delta areas. During successive growing seasons cypress continued to die producing concentric zones of mortality. To understand the effects of these effluents, which are not immediately lethal, several experiments have been conducted examining physiological and morphological responses. First year Bald Cypress (*Taxodium distichum* L.) seedlings were subjected to three temperature regimes (ambient, mid and high (approximately 15 C above ambient)) and three flooding regimes (drained, saturated and flooded soil). In the first study, different flooding levels had little effect on biomass or root carbohydrates within the ambient and mid temperature treatments. The mid temperature treatment had increased biomass over the ambient and hot temperatures. However, the hot flooded treatment resulted in low root biomass and the lowest concentration of root carbohydrates. A second study using the same treatments investigated physiological parameters which might account for and be indicators of the observed response in root carbohydrates. Net photosynthesis decreased with increasing temperature and was lowest in the hot flooded treatment. Sublethal

stress combinations decrease photosynthesis and result in lower carbohydrate reserves affecting the ability of seedlings to overwinter and resume growth in the spring.

13

ULASZEK, ERIC F. Southern Illinois University at Carbondale--A floristics study of Devil's Kitchen Lake watershed on Crab Orchard National Wildlife Refuge, Williamson and Union Counties, Illinois.

A two year floristic study was conducted on a portion of the Crab Orchard National Wildlife Refuge in southern Illinois. A diverse assemblage of plant communities is present on the study site, with many unusual species. An artificial lake has had an impact on the existing plant communities, and new plant communities associated with the lake have appeared.

14

RAFAILL, BARBARA L. USDA Forest Service, Northeastern Forest Experiment Station, Berea, Kentucky and Southern Illinois University at Carbondale--Establishment of seedling trees, shrubs, and woody vines on artificially revegetated and abandoned surface mines.

Seedling tree, shrub, and woody vine data were collected as part of a study to compare vegetational features on abandoned, naturally revegetated mines with artificially revegetated mines of similar age, aspect, and location. During the summer of 1983 shrubs and woody species greater than or equal to 1m tall but less than 2.5cm DBH were sampled using 1 x 20m subplots on the outcrops of four 15-to-20-year old contour coal surface mines identified as study sites in the Cumberland Mountains. Overall similarity among study sites was 31 to 55% according to Sorensen's Index of Similarity. In comparing seedling trees only, no apparent trends were noted in density between abandoned and artificially reclaimed sites or between high elevation and low elevation sites. *Acer rubrum* was the most important seedling species on all sites as determined by density; *Liriodendron tulipifera* displayed relatively high densities on three of the four sites. Seedling similarity among sites was 35 to 67% while similarity of shrub and vine species was 22 to 86%. *Rubus* sp. was the only shrub common to all four sites; no vine was found common to all sites. Results of this sampling in conjunction with those found during sampling of the tree and sapling size classes demonstrate the development of mixed mesophytic forest on all the mines studied regardless of their post-mining treatment.

15

Megonigal, J. Patrick and Frank P. Day, Jr. Old Dominion University--Organic matter budgets for the Great Dismal Swamp. Organic matter budgets for four major community types in the Dismal Swamp provide a basis for comparing structural and functional

variation within this ecosystem. Above ground net primary production (NPP), litter persistence, and soil organic matter are greatest on seasonally flooded sites. The Atlantic white cedar site (continuously flooded 4 months) has the highest production and accumulation of woody litter, soil organic matter, and NPP (10413 Kg ha⁻¹ yr⁻¹). The cypress and maple-gum sites (continuously flooded 6 months and fluctuating 6 months, respectively) are comparable in litter production, decay rates, and NPP (9900 and 9662 Kg ha⁻¹ yr⁻¹, respectively). The mixed hardwood site (unflooded) is least productive (NPP=8219 Kg ha⁻¹ yr⁻¹), but has the greatest below ground biomass. It appears the extent to which flooding promotes above ground production and inhibits below ground production is dependent on hydroperiod. A preliminary model for organic matter accumulation will be presented.

16

SHARP, JENNIFER L. and JOE E. WINSTEAD. Western Kentucky University--Increases of elemental sulfur in wood of *Quercus alba* L. from central Tennessee and Kentucky.

Growth increments sampled by coring wood of white oak populations indicate increases of accumulation of elemental sulfur that correlate with anthropogenic atmosphere emissions of SO₂ during the second half of this century. The analysis utilized a LECO SC-132 solid sulfur determinator which involves combustion of samples and infrared detection. Samples from central Kentucky and Tennessee generally showed a 37 percent increase in sulfur levels in wood formed from 1966 through 1983 compared with xylem growth accumulated from 1911 to 1955. Results observed were independent of individual tree age and diameter. These results indicate a trend of biochemical change that parallel known patterns of altered precipitation chemistry.

17

LINCOLN, DAVID E. University of South Carolina--Photosynthesis and carbon allocation in *Heterotheca subaxillaris* (Asteraceae) rosettes.

The influence of nitrogen supply on photosynthesis, growth and carbon allocation of camphorweed (*Heterotheca subaxillaris*) was studied as part of an investigation on the relationship of plant carbon and nitrogen budgets to herbivory. Leaf photosynthetic rates were closely and directly related to the nitrogen content of the leaves (R = 0.70, p < 0.0001). Leaf nitrogen content, and consequently plant growth, declined with nitrate supply rate. Equivalent herbivore consumption of camphorweed plants with high versus low leaf nitrogen levels would have less impact at high levels because of the higher associated photosynthetic and growth rates compared to plants with low leaf nitrogen. However, the root/shoot ratio was over 2-fold greater at low nitrate supply than at high nitrate supply. Hence, herbivory on leaves of plants growing at high nitrogen supply would have a greater

effect on shoot growth while leaf loss from plants growing at low nitrate supply would have a greater relative impact on root growth.

18

DE SELM, H. R. The University of Tennessee--Appalachian Ranges vegetation classification.

Natural areas in the Appalachian Ranges (Ridge and Valley and Blue Ridge Provinces) have been examined as part of a National Park Service study of potential natural landmarks. More than 134 sites were examined; some were scenic; very few contained unspoiled vegetation; some contained rare or relict biota. General vegetation classes were divided more or less evenly between forest and non-forest. The most prevalent forest vegetation was in types dominated by oaks but pines and other conifers and mesic hardwood types occurred. Non-forest vegetation included various kinds of scrub, grassland, rock outcrops and types in wet habitats including canebrakes, bog meadows, marshes, and open water vegetation.

19

WERTH, CHARLES. University of Virginia--Evidence of diploidization of gene expression in Asplenium species.

The high basic chromosome numbers of all homosporous fern genera strongly suggest that they have diversified from one or more lines of polyploid taxa (paleopolyploidy). Although it has been hypothesized that paleopolyploidy figures prominently in the organization of fern genomes and in their population genetics, recent isozyme studies of several genera have encountered diploid gene expression in those species possessing the basic chromosome number for the genus. In the present study gene expression was compared electrophoretically for eleven enzyme systems in three diploid ($n=36$) species of *Asplenium* and in their three allotetraploid ($n=72$) derivatives. Diploidized gene expression was observed at all loci in the diploids with the exception of PGM-2 in *A. montanum*. This exception may represent an isolated case of retention of ancient polyploid expression, or more likely represents a more recent gene duplication. In the allotetraploids, duplicated gene expression was observed at those loci for which the diploid parents possessed electrophoretically distinguishable alleles. Occasional exceptions to this may represent incipient diploidization.

20

MATTHEWS, JAMES F. and PATRICIA A. LEVINS. University of North Carolina at Charlotte The probable introduction of *Portulaca amilis* Spegaz. into the Southeast.

Portulaca amilis was first identified as a component of the southeastern flora in 1981. Prior to this time it had been included as a

part of an expanded species concept of *P. pilosa*. In the course of a revision of *Portulaca*, examination of herbarium specimens from throughout the Southeast provided information on the probable introduction and spread of this species into the United States. These historical data could only have been obtained from an analysis of herbarium specimens representing a range both in time and in geography. This illustrates the necessity of having both past and recent collections and documents the value of distributional data.

21

MATTHEWS, JAMES F. and PATRICIA A. LEVINS. University of North Carolina at Charlotte--A scanning electron microscopic analysis of the taxonomic characters of seeds of *Portulaca*.

Herbarium specimens of *Portulaca* are usually poorly preserved due to the succulent nature of the genus. Taxonomic characters have been sought in traits less affected by drying, such as the surface texture, color and size of seeds. In many herbarium specimens lacking identification traits such as flower color, seeds have been used as the primary means of determining the species. Discussion will detail a technique for studying seed variability over a broad geographic range and relate this technique to the geographic variability in *Portulaca* by highlighting the problems associated with relying solely on seeds for identification.

22

MELLICHAMP, T. LAWRENCE. University of North Carolina at Charlotte--The relationship of *Sarracenia* and *Nepenthes* pitcher-plants.

The carnivorous families *Sarraceniaceae* and *Nepenthaceae* were once thought to be phylogenetically related because of the similarities in the structure of their extraordinary insect-trapping and digesting leaves. However, even casual observation of the flowers of the two genera *Sarracenia* and *Nepenthes* shows that they are totally unrelated. Leaving the vegetative resemblance to be explained as convergent evolution. While the 10 species of *Sarracenia* are characteristic of mostly moist, open savannah-like "bogs" in the southeastern U.S., the 70 species of *Nepenthes* are concentrated in the Indo-Malaysian region where they are considered as "jungle-dwellers." *Sarracenia* are rhizomatous plants with erect trumpet-shaped leaves and solitary, showy, perfect flowers. *Nepenthes* are tendril-climbing vines with "leaf-tip" pitchers, and are dioecious with terminal racemes of small insect-pollinated flowers. Despite these important differences, these two genera seem to share an uncanny similarity in their preference for moist, open, nutrient-poor habitats. Furthermore, interspecific hybridization may occur within each genus whenever phenologies and pollinators overlap. Despite much taxonomic study, we know very little about the roles of specific environ-

mental factors in determining species distributions; but they may include such items as the nature and abundance of prey and the role of evapo-transpiration which may determine pitcher shape and position.

23

HORN, CHARLES N. University of Alabama--
Morphology and distribution of
Heteranthera (sensu lato; Pontederiaceae)
in the southeastern United States.

Four genera of the Pontederiaceae; *Eichhornia*, *Pontederia*, *Heteranthera*, and *Zosterella* are known from the southeastern United States. The latter two genera are included in the broadly defined genus *Heteranthera*. The three species of the restricted genus *Heteranthera* are all annuals, produce both a vegetative and flowering stem, and have zygomorphic flowers. *Heteranthera reniformis* is scattered throughout the southeast, has a distinctly reniform leaf, and produces 3-8 flowers per inflorescence with multicellular hairs on the filaments of the two lateral stamens. Additionally, the perianth wings are asymmetrically arranged around the central axis. The closely related species, *H. rotundifolia* and *H. limosa* are restricted to the western region of the southeast, being much more common in the Great Plains. Both have monoflorous inflorescences, wings symmetrically arranged around the central axis and glandular pubescent filaments. *Heteranthera limosa* and *H. rotundifolia* may be distinguished, based on a number of morphological and ecological characters. *Heteranthera rotundifolia* is unique in the family by having lateral flanges on the upper middle perianth wing. *Zosterella dubia* is a perennial, overwintering as submersed vegetative stems. The inflorescence stem is reduced to a single sessile spathe and flower with six yellow, equal perianth wings. Additionally, petiolate leaves are not produced and emersed leaves are similar to submersed leaves, but smaller and thicker.

24

HARDIN, JAMES W. North Carolina State University--Foliar Trichomes
in American Beech.

The polymorphic *Fagus grandifolia* Ehrh. is usually treated as two varieties, var. *mexicana* (Mart.) Little, in the Sierra Madre Oriental of Mexico, and var. *grandifolia* in southeastern Canada and eastern U.S. The latter was described by W. H. Camp in 1951 as consisting of three intergrading races based upon several features including the inter-vein vestiture of the abaxial leaf surface: "gray beech" (high elevations in the Appalachians and northward) glabrous, "red beech" (mid elevations in the mountains and northward) intermediate, and "white beech" (Piedmont and Coastal Plain) pilose. Using SEM, it was found that beech actually has four foliar trichome types (simple, bulbous,

solitary, and acicular) but that the varieties differ only quantitatively. The first three of these trichome types persist on the leaves in fair quantity. The acicular type (easily seen with a light microscope) is the one usually observed and which varies ecologically and geographically and the one of importance in the recognition of the three races. Variety *mexicana* is similar to the "gray beech" in foliar vestiture. This represents a long-range disjunction of about 1150 miles between the Mexican highlands and the Southern Appalachians.

25

HARDIN, JAMES W. North Carolina State University--A close look at
the fruits of Sumac.

Rhus subg. *Rhus* is characterized by having more or less erect, stout branches; odd-pinnately divided leaves; dense, terminal, thyrsoid inflorescences; and reddish drupes covered by glandular and eglandular trichomes. These trichomes have been examined using SEM and are found to be of five types: capitate gland, bulbous gland, fusiform, clavate, and acicular. Each species has a characteristic complement of types. Interspecific hybrids (natural and artificial) either combine the types characteristic of the parents or have a trichome type which is morphologically intermediate between two of the parental types.

26

STRITCH, LAWRENCE R. Southern Illinois University-Carbondale--A
Revision of the Leguminous Genus
Wisteria Nuttall.

The taxonomy of the genus *Wisteria* has proven confusing to taxonomists and field biologists for over 150 years. Since Torrey & Gray published *Wisteria frutescens* var. *macrostachya* taxonomists have discussed its proper taxonomic positioning or even if it deserves to be considered a separate taxon. The Asiatic wisterias and their numerous cultivars have proven to be difficult as taxonomists have discussed the merits of their legitimacy as taxa. In this revision the author has placed *Wisteria macrostachya* in taxonomic synonymy with *Wisteria frutescens*. The Asiatic wisterias have been separated into the genus *Rehsonia*. *Rehsonia brachybotrys* (Sieb. & Zucc.) Stritch has been determined to be a good species. The hybrid *Rehsonia xformosa* (*Rehsonia sinensis* X *Rehsonia floribunda*) is abundant and completely naturalized throughout the southeast United States. In conclusion the genus *Wisteria* is considered to be monotypic and seven species and one hybrid constitute the genus *Rehsonia*.

27

PITTMAN, ALBERT B. Vanderbilt University--Ultraviolet photography in biological systematics and ecology.

A fast, relatively simple photographic technique for recording longwave ultraviolet reflectance/absorbance patterns was developed and tested. Using a 35mm SIR camera body fitted with a Polaroid camera back, these patterns were recorded with an enlarging lens--UV filter combination. Ambient light conditions in the field or fluorescent "black light" tubes in the darkroom provided longwave ultraviolet illumination. Specimens of the well-studied Rudbeckia hirta L. (Black-eyed Susan) were used as experimental subjects to test the optical system. Relative to the cost of specially designed UV lenses, the system described is much less expensive.

28

KEMP, ANDREW and WILLIAM H. MURDY. Emory University--Silencing of duplicate genes of *Talinum mengesii* Wolf (Portulacaceae)

Silencing of duplicate genes specifying glutamate-oxaloacetate transaminase (GOT) isozymes in *Talinum mengesii* was investigated using starch gel electrophoresis. Populations of *T. mengesii* vary with respect to their number and patterns of GOT isozymes. There is evidence to support the following hypotheses: (1) GOT isozyme bands in *T. mengesii* are specified by four different gene loci; (2) the absence of GOT isozymes is due to the presence of null alleles; (3) silencing of duplicate GOT genes in *T. mengesii* has strong non-random components.

29

MCKINNEY, LANDON E. Barcon Inc.--Preliminary investigations into the nature of *Viola palmata* L. and its allies.

The polytypic nature of *V. palmata* L. has been well documented. A number of peripheral morphologies have been described and maintained as distinct and separate species. Preliminary investigations were conducted in both field and herbaria to determine the relationship between *V. palmata* and several morphologically similar taxa. One such

taxon, *V. stoneana* House, represents a mosaic of morphologies which for the most part are well within the expected range of variation encountered with *V. palmata*. Thus, *V. stoneana* appears unworthy of any formal level of distinction and accordingly should be reduced to synonymy. Another taxon, *V. triloba* Schweinitz, although morphologically similar, is easily separable based on definable differences in lamina structure, habitat, and the heterophyllous nature of *V. triloba*. Thus, its maintenance as a separate species seems justified.

30

GUTHRIE, MILO J. Tennessee Native Plant Society--The genus *Physalis* in middle Tennessee; some taxonomic problems.

The genus *Physalis* L. is a confusing one. This is due to intraspecific variation, similarities among distinct taxa, as well as nomenclatural revision and confusion. Detailed field observation and collection has been done on eight *Physalis* taxa in middle Tennessee, with additional collections done in Missouri. An accurate photographic record has been kept of flowering and fruiting development. Through field observation and data collection from living specimens, characters are noted which can be of use in differentiating among herbarium material. In the *P. pubescens* complex, vars. *pubescens* and *grisea* are distinct, but best regarded as varieties; while var. *glabra* is sufficiently distinct to be referred to *P. cordata* Mill. Its fruits, like those of the other taxa, are edible. They are not as sweet as others, and lend themselves to cooking. Two varieties of *Physalis longifolia* Nutt. have been studied; var. *longifolia* and var. *subglabrata*. They are distinct, and not part of a complex including *P. virginiana* Mill. The latter species is distinct in morphology and habitat, at least in middle Tennessee. This paper is based on research done in middle Tennessee, and its conclusions need to be tested throughout the range of the taxa studied.

31

MURRELL, ZACK E. University of Tennessee--The floristic and phytogeographical significance of Big Frog Mountain, Polk Co., Tennessee.

The results of a two year study of the vascular flora of Big Frog Mountain, a 7000 acre area in the Cherokee National Forest, are presented. Historic, floristic and distributional data were studied to elucidate the factors influencing the flora of Big Frog Mountain. Eleven vascular plants listed as endangered, threatened or

special concern in Tennessee were present in the flora. Of these taxa, Coreopsis latifolia Michaux, a southern Appalachian endemic, is a state record for Tennessee and under consideration for federal listing. The other noteworthy plants are southern Blue Ridge endemics and northern taxa whose ranges extend down the southern Appalachians. Prenanthes roanensis (Chickering) Chickering, a Blue Ridge endemic, and Dryopteris campyloptera Clarkson, a northeastern boreal element which extends southward through the Appalachian Mountains, have their southernmost stations on the slopes of Big Frog Mountain. In summary, the floristics of the study area are compared to the flora of the Blue Ridge Province as a whole to determine the relative floristic richness of this potential Cherokee National Forest Wilderness Area.

32

POST, BARBARA J. University of North Carolina at Charlotte--Species biology of Coreopsis latifolia Michaux. Coreopsis latifolia Michaux (Broad-leaved tickseed) is a rhizomatous herb found in the mountains of North Carolina and Tennessee and considered endangered by the N.C. Plant Protection Program. Reproductive and pollination biology are of particular interest in considering the rarity of the species. The functional pollination system, seed set, and germination are being studied. Seed set and germination data for C. latifolia are being compared to the same data for co-occurring and flowering, yellow composites. Other points to be discussed are the role of disturbance in establishment of the species, management practice for population maintenance, and removal of the species from the endangered list.

33

CARTER, M. E. B., W. H. MURDY, and S. SUMMERS. Emory University--Electrophoretic Analysis of Diploid and Tetraploid Talinum mengesii from the Georgia Coastal Plain.

A tetraploid population of Talinum mengesii ($2n = 48$) was reported from Coffee County in the Coastal Plain of Georgia. Plants from this population were collected and their ploidal level confirmed. Plants also were collected from a nearby outcrop, and chromosome counts revealed that these were diploid ($2n = 24$). The tetraploid and diploid populations were analyzed for gel electrophoretic variation using 9 enzyme systems and 23 gene loci. The diploid populations had only one allele which was not found among nine populations of T. mengesii previously examined. However, the tetraploid population had eight alleles which were not present in T. mengesii. Seven of these alleles are present in T. calycinum ($2n = 24, 48$) which has not been reported in the Southeast, but is widely distributed west of the Mississippi River.

These results suggest the diploid T. mengesii plants occur in the Coastal Plain, but that the tetraploid population has a genome which appears to combine genetic elements of both T. mengesii and T. calycinum. Analysis of floral characters support these results.

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RAYNER, DOUGLAS A., CYNTHIA AULBACH-SMITH, and SOUTH CAROLINA ADVISORY COMMITTEE.* South Carolina Wildlife and Marine Resources Department and University of South Carolina--Rare, Threatened and Endangered Vascular Plants in South Carolina-1984 Revision.

This revision includes 44 species of national concern, 36 of regional concern, 89 of statewide concern and 131 of status unresolved. Some of the more interesting additions include Anemone caroliniana, Carex biltmoreana, Croton elliotii, Gaylussacia mosieri, Forestiera segregata, Helenium brevifolium, Quercus durandii, Sabatia kennedyana, Sagittaria isoetiformis, Syngonanthus flavidulus and Trillium reliquum. Deletions of potential interest include Ilex amelanchier and Nestronia umbellula. Species under federal status review for listing that were not added included Eulophia ecristata, Gentiana autumnalis and Lobelia boykinii. Reasons for these and other additions and deletions to the list will be discussed in detail. Litsea aestivalis and Schwalbea americana were kept on the list, in spite of more than 15 known occurrences because South Carolina appears to harbor the vast majority of known populations.

*Members include: J. Angerman, W. Batson, M. Creel, C. Douglass, F. Eargle, J. Fahey, L. Gaddy, A. Hodge, S. Leonard, J. Logue, R. McCartney, J. Nelson, G. Newberry, J. Pinson, R. Porcher, D. Rembert, C. Rogers, R. Schoenike, W. Schrader, R. Sharitz, and H. Shealy.

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Johnson, George P. North Carolina State University--A taxonomic revision of the chinquapin chestnuts (Castanea section Balanocastanon).

The relative distinctness of certain chinquapin taxa, the level of recognition, and the relationships among them have been interpreted differently by various authors, and has lead to the designation of the "pumila complex." A revision of this group utilizing herbarium, field, and laboratory methods (including SEM, leaf flavonoid chemistry, floral and foliar morphology, and pollination biology) indicates that all individuals should be considered to belong to one species, Castanea pumila (L.) Mill., which is composed of two varieties, pumila, and ozarkensis (Ashe) Tucker. Variety pumila is a highly variable shrub or small tree which is widely distributed throughout the eastern and southeastern United States. Variety ozarkensis is a tree and has a

limited distribution, being confined to the Ozark Highlands and to north central Alabama. *Castanea* x *neglecta* Dode, an uncommon hybrid between *dentata* and *pumila* var. *pumila*, is found in areas of sympatry between its parents.

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MCDUGAL, KAREN M. Department of Biology, Lenoir-Rhyne College--Chemical characterization of several species of red oaks from the eastern United States.

Flavonoids of four members of subgenus *Erythrobalanus* of the genus *Quercus* were examined using HPLC. *Quercus rubra* (red oak) was studied extensively and representative samples of black oak (*Q. velutina*), scarlet oak (*Q. coccinea*) and Hill's oak (*Q. ellipsoidalis*) were analyzed. *Q. rubra* is a wide-ranging species with 2 intergrading chemotypes. Trees from low latitudes and low elevations contain quercetin and kaempferol glycosides; those from high latitudes and elevations synthesize myricetin glycosides as well. Flavonoid profiles are complex throughout the range. *Q. velutina* is similarly widespread in the eastern US but exhibits no such infraspecific variation. Flavonoid profiles of trees from NC, PA and WI are qualitatively similar and resemble those of low elevation red oak. They are easily distinguished by their high concentrations of rutinoides and low levels of the pentosides which characterize red oak. Scarlet oak is sympatric with red and black oak over most of its range. Its flavonoids are similar to those of high elevation red oak, with high levels of myricetins and arabinosides, but much higher levels of early eluting compounds. Hill's oak is restricted to the upper mid-west where it is sympatric primarily with *Q. rubra*. Chemically it is almost identical to the high elevation form of red oak.

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BONNER, LISA A. and CLAY M. CHANDLER. Middle Tennessee State University--Ecology of macroinvertebrates in a small springbrook, Cannon County, Tennessee.

Physicochemical and biological data were collected on a small, rheocrene springbrook in Cannon County, Tennessee from February 1983 through January 1984. Three stations were established, and three samples of benthic macroinvertebrates were taken from each station every six weeks with a square foot (0.093 m²) Surber sampler. Of the 4315 macroinvertebrates collected, 43 genera were represented. The eight most abundant genera in the springbrook in order of dominance were *Goniobasis*, *Heptagenia*, *Psephenus*, *Baetis*, *Ephemerella*, *Gammarus*, *Helichus* and *Stenonema*. The maximum number of organisms was collected in January 1984 with minimum numbers in autumn.

The number of macroinvertebrates/m² increased markedly downstream due mainly to drift. Various physicochemical parameters were obtained during each sample date to observe their effects on macroinvertebrate distribution. The major factors which most influenced population changes were substrate, discharge, dissolved oxygen and temperature.

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ORVOS, DAVID R., CLETUS M. SELLERS, JR., and NORMAN E. GARRISON. James Madison University--Effect of intermittent chlorination upon in vitro protein synthesis of rainbow trout (*Salmo gairdneri*).

Previous studies (Booth et al., 1980) have determined that intermittent chlorination alters plasma protein electrophoretic profiles. To ascertain toxicant effect upon protein synthesis, optimal conditions for in vitro incorporation of ¹⁴C-phenylalanine into acid-precipitable polyphenylalanine and ribosomal translational efficiency were determined using rainbow trout (*Salmo gairdneri*) liver ribosomes and poly-U messenger. Endogenous mRNA activity was subtracted. Rainbow trout were exposed in 430 l flow-through tanks to increasing concentrations of total residual chlorine until 0.22 mg l⁻¹ was obtained. Chlorine input was terminated after 2 h, and dechlorinated water flow was initiated. Total residual chlorine concentration diminished during the remainder of the test. Preliminary investigations indicate that ribosomal translational efficiency is decreased by chlorination. Statistical relevance of and toxicant effect on endogenous mRNA are being evaluated.

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ROLLER, KENNETH W., CLETUS M. SELLERS, JR., and GILBERT S. TRELAUNY. James Madison University--Effects of intermittent chlorination on the plasma amino acid levels of rainbow trout (*Salmo gairdneri*).

Significant alteration in the concentrations of several key plasma proteins has been noted following exposure of rainbow trout (*Salmo gairdneri*) to sublethal chlorine levels (Booth et al. 1980). Since such changes may be reflected in the plasma amino acid pool, the effect of chlorine on the levels of these amino acids was examined. Rainbow trout were exposed to a chlorine pulse of 2 hour duration and peak TRCl₂ concentration of 0.2 mg l⁻¹. Blood sampling was accomplished via cannulation of the dorsal aorta with samples taken before, during and for 6 hours following exposure. Plasma amino acid levels were determined using reversed phase HPLC. Analysis of control and experimental data yielded no significant differences between groups in the concentration of any amino acid examined. The significance of these results with respect to previous studies was evaluated.

WILLIAMS, JOHN M. University of Virginia--A mechanism for long distance dispersal of fresh water organisms.

Warm and cold cores of water distinct from surrounding ocean water in fauna and salinity have been discovered regularly crossing the North Atlantic (Wiebe, 1982). Phytoplankton groups from the lower Chesapeake Bay have been found in plumes of southward moving water currents on the ocean shelf off of North Carolina (Marshall 1982). These phenomena may indicate a mechanism for the dispersal of fresh water organisms at the end of the last Pleistocene deglaciation. My calculation of potential fresh water runoff from the Laurentide ice sheet from 12000 b.p. to 7000 b.p. based on data from Flint (1971) shows that 57099 cubic meters per second could have flowed down the Hudson, Susquehanna and Mississippi river valleys. This is 1.8 times the maximum flood flow from Hurricane Agnes in the Chesapeake Bay (Gross, et. al., 1978). Large inflows of glacial fresh water could have reduced offshore salinities for extended periods and provided a directional force and time for fresh water organisms to migrate north and south along continental shelves. This mechanism and modern counterparts may account for the distribution and apparent migration of fresh water fishes (Myers, 1966) and estuarine shrimp (Glaister, 1978) in historic and present day environments.

OSBURN, M. VIRGINIA. University of North Carolina at Wilmington--A population survey of gammaridean amphipods occurring in sandy estuarine intertidal habitats in southeastern North Carolina.

In the fall of 1982 near Wrightsville Beach, N.C., the distribution of epifaunal and sand burrowing amphipods in relation to depth in the sand substrate was examined in three intertidal zones. These zones differed in exposure time, Eh with depth, and habitat complexity. A total of 6 families and 8 species of gammaridean amphipods was collected. Zone 1 which was exposed for only approximately 1 hour exhibited the lowest Eh values and the lowest total number individuals but had the same level of species richness as zone 2 which was exposed for approximately 5 hours during the tidal cycle. A *Haustorium* sp. was found to occur in the greatest Eh and depth range. Zone 3, characterized as having both sparse and dense *Spartina alterniflora* culms, had the highest species richness and the greatest total number of individuals. It is

evident that substrate complexity and Eh in sandy intertidal habitats dictate amphipod species richness and population density.

JOY, JAMES E. and MICHAEL RENAUD. Marshall University--A study of prevalence and infection intensity levels for *Chaetogaster limmaei* (Amelidae: Naididae) in three genera of aquatic snails from western West Virginia.

A total of 377 snails, in three genera, were collected from McClintic Wildlife Station Pond #6, Mason Co., W. Va. over an eight month period (30 March thru 18 October 1984) and examined for *Chaetogaster limmaei*. Prevalence of this annelid worm was highest in *Helisoma antrosa* where 168 of 222 (75.7%) individuals were infected. Forty-eight of 99 (48.5%) *Physa* sp. individuals were infected, while 26 of 56 (46.4%) "lymnaeid" snails harboured *C. limmaei*. A Chi-Square contingency test demonstrated that the higher prevalence for *H. antrosa* was significant ($P < .05$). Mean intensity of infection was highest in the "lymnaeid" at 5.8, followed by means of 4.8 and 3.7 for *H. antrosa* and *Physa* sp., respectively. Monthly trends in prevalence or mean intensities were not evident. Scatter diagrams showed virtually no correlation between size of snail (as determined by shell diameter or height) and the number of *C. limmaei* individuals present.

JOVANOVIĆ, MARINA C. and KEN R. MARION. University of Alabama at Birmingham--Effects of body lipids, carbohydrates and temperature on uptake and depuration of anthracene by the clam, *Rangia cuneata*, in Mobile Bay, Alabama.

It has been suggested in the literature that seasonal variations in the accumulation and release of polycyclic aromatic hydrocarbons in bivalves exist. In this study, the clam *Rangia cuneata*, was dosed every 6 weeks for a one-year period with 200 ppb ($9-^{14}C$) anthracene at 10, 20, and 30° C. Uptake of ($9-^{14}C$) anthracene was determined in clams over a 15-hour period, and depuration was also measured over a period of 2 weeks. These data were statistically analyzed and correlated to the annual cycles of body lipids and carbohydrates. *Rangia* was found to accumulate approximately 20 times the concentration of anthracene in water. Results indicate that uptake and depuration of anthracene increases with temperature. The nutritional status or stage of the reproductive cycle also influences the pattern of accumulation and release of anthracene. Research sponsored by Mississippi-Alabama Sea Grant No. NA81A-D-0050.

GENTER, ROBERT B., DONALD S. CHERRY, and JOHN CAIRNS, Jr. Virginia Polytechnic Institute and State University--Periphyton population and community changes due to zinc stress in Artificial substrates.

Traditional studies of the effect of toxic concentrations of a substance on algae have generally focused on single species tests under controlled laboratory conditions. Natural interactions between species and effects of natural variability in the environment have been excluded or controlled. Monitoring of periphyton communities in outdoor, flow-through, artificial stream mesocosms suggests that analyses of population and community levels of biological organization is useful in indicating stress. In this study, established periphyton communities were exposed continuously to one of three zinc treatments (control, 0.05, 1.0 mg/l), and samples were collected when dosing began (day 0) and subsequently on days 2, 5, 10, 20, and 30. At the population level, 7 of the 11 dominant taxa showed significant differences beginning on day 2, in density between treatments. At the community level, periphyton total density and the SIMI similarity index showed significant differences between treatments by day 20. Results indicate that changes occur rapidly at the population level and more slowly at the community level.

SAPPINGTON, K. G., P. M. STEWART, and J. CAIRNS, JR. Virginia Polytechnic Institute and State University--Measurement of diatom community changes resulting from various zinc concentrations in laboratory mesocosms.

The objective of this study was to examine the effect of zinc on diatom diversity and proportional abundance in laboratory mesocosms. Diatoms were collected on polyurethane foam substrates that were placed in duplicate tubs containing 0, 1, 10, and 100 ppm Zn. Each tub contained six substrates and was maintained at 15°C in 16L:8D environmental light regime. Identifications of 99 diatom species were made from a total of 34 samples taken at days 0, 7, 14, 21, and 28. A non-parametric two-way analysis of variance indicated significant differences in diatom diversity resulting from different zinc concentrations. The Shannon-Weiner diversity index for communities dosed with 1 ppm Zn was significantly different from communities dosed at 10 ppm Zn ($p < 0.001$, Friedman's S). There was no significant diversity difference between 0 and 1 ppm Zn. Proportional abundances of dominant diatom species were also affected at different zinc concentrations. For example, the proportional abundance of Gomphonema parvulum was reduced between 0 and 1 ppm Zn ($p < 0.025$, Friedman's S). In contrast, the proportional abundance of Achnanthes lanceolata was significantly reduced between 1 and 10 ppm Zn ($p < 0.01$, Friedman's S). The effective concentration

of zinc on diversity was between 1 and 10 ppm; however, the effective concentration on proportional abundance varied from species to species. Because species have different tolerances to equivalent concentrations of a toxicant, growing evidence supports the use of multispecies toxicity testing.

KRAUS, JOHN F. Southeastern Forest Experiment Station, USDA, Forest Service --Interspecific hybridization of Pinus echinata x P. taeda.

The hybrid of shortleaf pine x loblolly pine is highly resistant to the fusiform gall rust (Cronartium quercuum (Berk.) Miyabe ex Shirai f. sp. fusiforme), a major cause of mortality and growth loss in loblolly pine (P. taeda L.) and slash pine (P. elliotii Engelm. var. elliotii). Some F₁ hybrids from controlled pollination of selected parents trees, and most backcrosses of selected F₂ hybrids to selected loblolly pine have growth rates equal to, or better than loblolly pine. Six years after planting F₁'s and backcrosses had, respectively, 44 and 34 percent less fusiform rust infection than loblolly pine. In a ten year old planting in central Georgia 17 backcross hybrids averaged 51 percent less rust infection than pure loblolly pine, and were not significantly different from loblolly pine in wood volume production. The data indicate that a fusiform rust resistant strain of loblolly pine can be achieved by breeding and selection, using shortleaf pine as the genetic source of disease resistance.

BROWNE, EDWARD T., JR. Memphis State University--The use of trypan blue for determination of plant cell viability.

For some years, microbiologists, zoologists, and medical researchers have used the biological stain trypan blue as a vital stain. Living animal and lower plant cells are impermeable to the stain, and non-living cells stain since these are permeable to trypan blue. Higher plant cells, however, react in exactly the opposite way: living cells are uniformly stained while non-living ones stain only partially or not at all. This stain can be used on a wide variety of plant cells and tissues: pollen, seeds, anther connective, filament, etc. Since an aqueous solution is used, this can safely replace aniline blue in lacto-phenol for pollen which won't be injurious in the hands of students or laypersons.

SHAW, ROSEMARY G., and DWAYNE WISE. Mississippi State University--Chiasma frequency and distribution in the wolf spider, Lycosa georgicola Walkenaer. Chiasma frequency and distribution were

studied in males of Lycosa georgicola Walkenaer. The chiasma frequency was scored by observation of light microscope preparations of cells at metaphase I and was always one per bivalent. The chiasma distribution was determined to be non-uniform with most chiasmata occupying either extremely proximal or extremely distal positions on the chromosome. The frequency and distribution of recombination nodules was determined from electron micrographs of pachytene cells and found to be similar to the frequency and distribution of the chiasmata.

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SHULL, J. KENNETH. Appalachian State University--Boone, N.C. Ultrastructural morphology of chromosomes and position of nucleoli in meiotic prophase I. Meiotic prophase I in Lilium was examined by electron microscopy and each photograph was classified in three ways: 1. The morphology of the chromosomes (condensed vs. diffuse), 2. the position of the nucleolus (appressed to the nuclear membrane or off of the membrane) and 3. the synaptic index (a measure of the percentage of chromosomes associated with the synaptonemal complex). The suggestion by several authors that the position of the nucleolus is a reliable indicator of meiotic stage is confirmed. The nucleolus moves to the nuclear membrane during zygotene and by early pachytene has moved off of the membrane. The general assumption that chromosomes show a greater condensation as meiotic prophase progresses was found to be in error. Such morphology is a poor indicator of the stages of meiotic prophase I.

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HOWELL-MAJORS, MARGARET, W. R. GORDON, and L. FREDERICK. Howard University--A comparative study of protein profiles of isolates of a natural mutant of Neurospora dodgei.

Protein profiles of mycelial extracts of single ascospore isolates of Neurospora dodgei, a homothallic species, have been obtained by acrylamide gel electrophoresis and these profiles have been compared with those from the wild type. The mutant is distinguished morphologically from the wild type by its round or peanut pod-shaped ascospores that may vary in number from 8 to 16 per ascus. Protein profiles of the four mutant isolates studied have been found to differ significantly from each other as well as from the wild type. In the profiles of the wild type, 22 bands have appeared. The four isolates of the mutant have produced profiles that contain either 21 bands (isolate B₄), 24 bands (isolate A₃), 26 bands (isolate A₂), and 28 bands (isolate A₁). Fifteen bands were common to the wild type and the four

isolates. In the respective profiles of the cultures, bands were present that were unique to either the wild type or to each isolate of the mutant. Six bands were unique to isolate A₆, four to isolate A₁, and two each to isolate A₂ and A₃. Even though these differences in protein profile patterns have been noted when the mutant isolates are compared, no distinct differences in the morphological or cultural features of the different isolates have been noted. (This study has been supported by an NSF RIMI grant award.)

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WILFRED, ANTONIA, L. FREDERICK, and W. LENA AUSTIN. Howard University--Observations on the nuclear behavior during ascosporeogenesis in a natural mutant of Neurospora dodgei.

Nuclear behavior during ascosporeogenesis has been studied with light microscopy in a natural mutant of Neurospora dodgei, a homothallic species. This mutant differs from the wild type of N. dodgei by forming round or peanut pod-shaped ascospores that vary in number from 8 to 16 per ascus. Cultures that represent single ascospore isolates of the mutant have been established and the nuclear events associated with ascospore formation have been observed. Nuclear events noted in the mutant have been compared with comparable events in the wild type in order to ascertain the extent of similarities and differences. Nuclear behavior has been found to be essentially identical in the mutant and the wild type through the first mitotic division in ascosporeogenesis. Following this division, in the wild type, ascospore delimitation occurs. In the mutant a second mitotic division usually occurs and results in a 16-nucleated ascus prior to spore delimitation. Following this division either 8 binucleate peanut pod-shaped spores, 16 round uninucleate spores, or some mixture of 9 to 15 uninucleate or binucleate spores are delimited. After spore delimitation uninucleate round or oval spores become binucleate. The initial binucleate nature of peanut pod-shaped spores remains the same with a single nucleus in each lobe. (This study has been supported by an NSF RIMI grant award.)

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HOLLAND, JOHN W. III.¹ Middle Tennessee State University--The effects of cadmium on in-vitro mitogen activity of murine spleenocytes in a primary immune response. The effects of cadmium chloride on B-cell mitogen activity is being determined in the Mishell-Dutton in-vitro cell culture. Trinitrophenylated Lipopolysaccharide (TNP-LPS), a T-cell independent mitogen, is being used to initiate B-cell proliferation in cultures containing cadmium chloride concentrations of 3, 30, and 300 ppm. The number of anti-TNP antibody producing cells is being determined using a modification of the Jerne hemolytic plaque assay, using TNP-SRBC

coupled by the procedure of Rittenburg and Pratt as indicator cells. Immunofluorescence is also being used to determine amount of B-cell proliferation.

¹ and Mary L. Reyes

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BLOCKER, KAY.¹ Middle Tennessee State University--Substitution of a 2-mercaptoethanol treated antigen for macrophages to elicit a primary immune response.

The chemical, 2-mercaptoethanol, has been shown to supersede the need for macrophages for induction of antibody in the primary immune response. Red cell ghosts of the sensitizing antigen (sheep red blood cells are used as antigen) are prepared using an osmotic lysis technique (Methods in Enzymology, v. 31). Antigen integrity of ghosts is tested by a neutralization antibody titer. Ghosts are treated with the chemical 2-ME. Mercaptoethanol is removed by lyophilization and the stroma retrieved. Antigen integrity is again tested by a neutralization antibody titer. This stroma is used as the sensitizing antigen in a cell culture system (Mishell-Dutton system). Spleen cells from DBLA strain mice are retrieved. Macrophages are removed by adherence methods. After an appropriate incubation period, antibody production is tested using the Jerne hemolytic plaque assay.

¹ and Mary L. Reyes

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RYALS, PHILLIP E. The University of Alabama--Iron(III), alpha-tocopheryl succinate, and low-transforming sublines of Tetrahymena vorax.

Tetrahymena vorax is a polymorphic ciliate. Usually, a population of *T. vorax* microstomal cells yield 70-90% macrostomal forms when subjected to chemical or physical stimuli. Occasionally, populations of low-transforming cells arise from the sub-culture of high-transforming stocks and yield <30% macrostomes following induction procedures. These low-transforming sublines are stable for periods ranging from as little as a few weeks to several years. The availability of such a subline provides a means to investigate the effects of various compounds, having known activities, on the transformation process. Alpha-tocopheryl succinate and two structurally related compounds enhance macrostome production in low-transforming sublines that have been subjected to a heat shock induction method. Antioxidants have no effect when used under the same conditions, however, the short-chain alcohols ethanol and 1-propanol exhibit a similar effect to alpha-tocopheryl succinate but to a lesser degree. Each alcohol is known to affect membrane fluidity and alpha-tocopheryl succinate is known to insert into membranes. The addition of ferric ions also enhances the ability of *T. vorax* to form macrostomal cells but ferrous iron does not. The increase in

transforming ability induced by the compounds named above have been shown to be statistically significant. Potential sites and modes of action will be discussed. This work was supported in part by a University of Alabama Student Research Fund Grant.

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REYNOLDS, THOMAS L. University of North Carolina at Charlotte--Chlorsulfuron inhibition of spore germination in the fern, Pteridium aquilinum and its reversal by isoleucine and valine.

Chlorsulfuron is a highly active sulfonylurea herbicide now used to control weeds in cereal crops. This chemical is unique in that it is a specific growth inhibitor that selectively blocks the progression of cells through the cell cycle. Spores of the fern, *Pteridium aquilinum* were cultured aseptically in liquid Knops medium. Cultures were treated with chlorsulfuron at concentrations ranging from 2.8×10^{-5} M to 2.8×10^{-9} M. At all concentrations this chemical inhibited spore germination. If cultures were treated with chlorsulfuron plus the amino acids, valine and isoleucine (each at a concentration of 10^{-4} M), germination percentages returned to near control levels. Chlorsulfuron is known to inhibit the enzyme acetolactate synthase. This enzyme is involved in an early step in the biosynthesis of isoleucine and valine. The reversal of chlorsulfuron inhibited spore germination by isoleucine and valine implicates these amino acids with the control of spore germination in this fern.

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REYNOLDS, THOMAS L. University of North Carolina at Charlotte--Morphogenesis of pollen callus cultures of Solanum carolinense.

In anther cultures of *Solanum carolinense*, Murashige and Skoog's medium (MS) supplemented with 2.2 mg/l 2,4-dichlorophenoxyacetic acid (2,4-D) and 6.0 mg/l kinetin (KIN) served as callus induction medium. Cytological observations confirmed that the callus originated from pollen grains. Upon transfer to medium lacking 2,4-D, callus cultures regenerated shoots exclusively. However, maximum efficiency in regeneration occurred only after callus had been maintained in the presence of 2,4-D for a minimum of 12 weeks. Callus younger than this or older than 16 weeks showed a significant decline in organogenic competence when transferred to the appropriate medium. It is suggested that 2,4-D may establish a transitory potential for regeneration in pollen-derived callus cultures but must be removed before this potential can be expressed.

STUMPF, NANCY J. and JON D. JOHNSON.
Virginia Polytechnic Institute and State
University--Ethylene production by lob-
lolly pine seedlings in response to
water stress.

Increased ethylene production has been observed as a response to water stress. This may contribute to a growth regulator imbalance resulting in plant responses which increase chances of survival. Objectives of this study were to determine the effects of water stress on production of ethylene and its precursor, aminocyclopropane-1-carboxylic acid (ACC) by needles and roots of loblolly pine (*Pinus taeda* L.) seedlings from a Texas drought hardy (DH) and a Virginia Coastal Plain (CP) family. Water stress and family had significant effects on both ethylene production and ACC levels in needles and roots. Production rates by CP needles increased slightly with initial stress (-1.3 MPa), then declined until water potential reached -1.6 MPa and increased sharply at -2.5 MPa. DH rates generally decreased with decreasing water potential. Ethylene production by root tissue was generally higher than needle production and decreased with decreasing water potential. ACC concentrations in needles and roots of both families began to increase when water potential reached -1.4 MPa, corresponding with stomatal closure. Mean levels in root tissue were only slightly higher than mean levels in needle tissue, suggesting that roots are more efficient in converting ACC to ethylene. Increased ethylene production by CP needles may reflect earlier sensitivity to water stress. An increase in ethylene production by DH needles may occur with greater water stress than observed in this study.

CREEK, ROBERT and GARY L. WADE. Eastern Kentucky University and Northeastern Forest Experiment Station--Excretion of phenolic compounds from the roots of
Festuca arundinacea, *Eragrostis curvula*,
and *Lespedeza striata*.

Festuca arundinacea, *Eragrostis curvula*, and *Lespedeza striata* were grown hydroponically using a continuous circulating system in which root exudates were collected in columns containing XAD-4 resin. The exudates were separated into neutral, acidic, and basic fractions. Lettuce radicle bioassay showed the neutral fractions to be inhibitory. Analysis of the neutral fractions by paper chromatography, TLC, and gas chromatography indicated the presence of five inhibitory compounds which were tentatively identified as the phenolic compounds cinnamic acid, ferulic acid, gallic acid, gentisic acid, and syringic acid.

WHITTIER, DEAN P. Vanderbilt University--Underground gametophytes of the ferns and fern allies.

The typical gametophytes of ferns are the

small, thin, heart-shaped, photosynthetic gametophytes which grow on the surface of the soil. A number of pteridophyte genera have fleshy, large, thick, white, non-photosynthetic gametophytes which grow underground. The gametophytes of *Psilotum* are long and cylindrical. The underground gametophytes of *Lycopodium* can be disk-, carrot-, or strap-shaped. Gametophytes of *Botrychium* are thick strap- or bean-shaped structures, while those of *Ophioglossum* are usually fragile, cylindrical structures. Although the morphology of these underground gametophytes is varied, all are dependent on endophytic fungi for their organic nutrition in nature. In axenic culture the spores only germinate in the dark. The gametophytes grow on nutrient media containing minerals and 0.25-0.5% glucose or sucrose. These are slow growing organisms, however mature gametophytes with antheridia and archegonia form after 1-3 years in culture. The gametophytes in culture, which lack the endophytic fungus, have the normal morphology. The absence of the endophytic fungus does not alter the structure of these gametophytes.

WALLACE, JAMES W. JR. and HU ZHIHAO.
Western Carolina University, and Yunnan University (China)--The biflavone enigma
relating to the origin of the leptosporan-
giate ferns.

Morphologists have usually considered the *Psilotaceae* to be a distinct evolutionary entity when compared to the leptosporangiate ferns. Biochemical evidence, relating to the distribution of polyphenolic compounds, has supported this view as species of the putatively primitive leptosporangiate ferns (*Gleicheniaceae*, *Stromatopteridaceae* and *Schizaeaceae*) accumulate flavonol O-glycosides while the *Psilotaceae* appear to accumulate biflavones and to a lesser degree flavones and C-glycosylflavones. The validity of this observation was questioned when biflavones were recently reported for *Osmunda japonica*, another primitive leptosporangiate fern.

The present research was not able to confirm the presence of biflavones in *Osmunda japonica* but only revealed the presence of flavonol-O-glycosides in this and 3 other species of *Osmunda*. In addition to *Osmunda*, a survey of 200 other leptosporangiate ferns failed to demonstrate the presence of biflavones. Hence, it appears that the apparent biochemical dichotomy between the leptosporangiate ferns and the *Psilotaceae* is still valid.

HARDY, MARK G. and J. CHARLES O'KELLEY.
University of Alabama--Nitrogen and the
Sexual Cycle in *Neosporangiococcum* sp.

A series of N-sources were supplied *Neosporangiococcum* sp. The organism grows best upon urea, then equally well upon nitrate or ammonium. Of various organo-nitrogen sources citrulline, xanthine, asparagine,

tryptophan and lysine supported growth. A number of forms of organo-N could not be used, including some amino acids. The effect of these N-sources upon zygote formation was also studied. With a few exceptions, those that supported vigorous growth produced few zygotes, and those that did not support growth permitted high zygote production. Zygotes were germinated only after a resting period of several months at low temperature (approaching 0° C). Zygote germination, which has a specific requirement for N, involves a greening of the zygote and the appearance of a pyrenoid, followed usually by a cytoplasmic cleavage (apparently accompanying meiosis) that produces four non-motile cells within the zygospore wall. These divide subsequently to produce motile cells.

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DOYLE, MICHAEL F. Dept. of Botany, Southern Illinois University at Carbondale--The genus *Crinipellis* Pat. in Illinois.

The genus *Crinipellis* Pat. includes all stipitate collybioid and marasmioid members of the Tricholomataceae (Basidiomycetes-Agaricales) in which the pileus and/or stipe are covered with long, hair-like, pseudoamyloid elements. *Crinipellis* now includes some species previously placed in such genera as *Collybia* and *Marasmius*. These fungi are primarily saprophytes (at least in most temperate species) often occurring on specific plant substrates. In Illinois, *Crinipellis* fruits during the late summer and continues into mid-fall. At present, two species are reported in the literature from Illinois, these being *Crinipellis stipitaria* (Fr.) Pat. and *Crinipellis zonata* (Pk.) Pat. (previously reported as *Collybia stipitaria* (Fr.) Gill. and *Collybia zonata* Pk., respectively). A third *Crinipellis* species, as yet undetermined, is new to Illinois. The distribution of the genus within the state was previously reported from two northern counties--Cook and McDonough, the range is now extended to three southern counties--Jackson, Pope, and Williamson.

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BARTHOLOMEW, SHARON E. East Tennessee State University--Sporeling Development Within the Metzgeriales (Hepatophyta)

Three general patterns of sporeling development occur within the Metzgeriales, including one endosporic and two exosporic patterns. The more prevalent exosporic patterns are typified by globose or cylindrical sporelings as in *Pallavicinia*, or by strap-shaped filaments as in *Metzgeria*. The endosporic pattern exemplified by *Pellia* is seen in only three of the 28 genera. In this

study, the sporeling patterns of representatives of 8 of the 12 metzgerialian families were observed and compared to determine the consistency of the patterns and to gain insight into the interrelationships of the Metzgeriales. Spores were axenically cultured on Hurey-Py medium and grown under controlled light (18:6 light-dark and 12:12) and temperature (10° and 18°C) regimes. Sporeling patterns were unaltered by environmental conditions, but developmental rates were increased in the higher temperature. The patterns are constant within species and show only minor variations within genera. For example, *Pellia* develops at a faster rate, is more elongate and less cordate than *P. epiphylla*, and produce most of its slime papillae from only one surface. Likewise, *Pallavicinia lyellii* and *P. subciliata* share the same general exosporic pattern, although *P. subciliata* develops more rapidly and may produce a short chain of cells before the basic pattern is initiated.

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RENZAGLIA, KAREN S. and CHIC-MEI CHIN. East Tennessee State University--Factors affecting the sexuality and growth of *Fossombronina brasiliensis* Steph.

In order to identify factors responsible for gametangial formation in *Fossombronina brasiliensis*, axenic cultures were subjected to various hormones and nutrient media and were grown under short day (12:12) and long day (18:6 light-dark) photoperiods at 10° and 18°C. Gametangial production was described both qualitatively and quantitatively and variability in vegetative growth was noted. Photoperiod and temperature have decisive influences on gametangial formation in *Fossombronina*. Gametangia were produced under the short day-length at both temperatures and under the long day-length only at 10°C. The majority of gametangia produced in this latter treatment were smaller than normal. Numbers of antheridia were significantly greater than archegonia in all treatments except in the 10°C chambers where more archegonia than antheridia were found. Hormones (GA, NAA and kinetin) and nutritional factors including nitrogen form and media concentration had little influence on the growth and sexuality of this plant. NAA enhanced rhizoid and callus production and reduced growth area which, in turn, resulted in a decrease in numbers of gametangia. Sodium nitrate as the nitrogen source slightly increased gametangial formation, and low nutrients (1/4 and 1/8 basal medium) resulted in an increase in growth area.

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QUARTERMAN, ELSIE. Vanderbilt University--Introduction. Background information for symposium on cedar glades of Middle Tennessee.

BASKIN, JERRY M. and CAROL C. BASKIN. University of Kentucky--Geographical distribution of the Southeastern cedar glade endemics.

The floristically distinct element of the Southeastern cedar (limestone) glade flora includes 26 endemic or near-endemic taxa; 9 of these belong to the genus Leavenworthia. The known areal extent of geographical distribution of the endemics ranges from one to three counties in a single state (e.g., Leavenworthia exigua Rollins var. laciniata Rollins and Delphinium alabamicum Kral) to 19 counties in five states (i.e., Viola egglesonii Brainerd). Recent herbarium and field studies have shown that some of the endemics are more widespread and abundant than formerly believed. Aside from Leavenworthia spp., which evolved in the cedar glades of northern Alabama and middle Tennessee (R. C. Rollins, Contrib. Gray Herb. 192: 3-98. 1963), the nearest relatives of most of the taxa occur in the western or southwestern U.S. or on the Gulf Coastal Plain. We suggest that Psoralea stipulata T. & G., an extinct species known only from herbarium specimens collected from a limestone island with glade-like habitats in the Ohio River at Louisville, Kentucky, be added to the list of Southeastern cedar glade endemics.

BRIDGES, EDWIN L. Tennessee Department of Conservation--Distribution patterns of the non-endemic flora of the limestone glades of Middle Tennessee.

The geographical and ecological distributions of selected taxa of the flora of the limestone glades of Middle Tennessee were compiled and analyzed. County range maps were prepared for these taxa and notes on their habitats compiled. The ranges and habitats of these taxa were analyzed on both the specific and infraspecific levels. Using these geographical patterns, published geological data, and habitat descriptions, several categories of distributional patterns were determined. These include disjunct species from the Interior Highlands, Till Plains, Great Plains, and/or Gulf Coastal Plain, widespread limestone or dolomite glade species, widespread species of various glade substrates, widespread weedy or opportunistic species, and exotic or adventive species. Several examples of these geographical and ecological distributions are presented, and areas for further research are suggested.

JORDAN, O. RAY. Tennessee Technological University--Cedar glades herpetofauna. Thirteen families of amphibians and reptiles inhabit Cedars of Lebanon State Park and

Forest (Wilson Co., Tennessee). Fifteen species of amphibians (5 salamanders, 8 frogs and 2 toads) and 19 reptiles (12 snakes, 5 lizards and 2 turtles) have been recorded. Many species common to Middle Tennessee are rare or absent in the glades while others appear more abundant. Among the latter are Cnemidophorus sexlineatus, Eumeces inexpectatus, Tantilla coronata, and Lampropeltis getulus.

DELCOURT, HAZEL R., PAUL A. DELCOURT, GARY R. WILKINS, E. NEWMAN SMITH, JR., and PETER A. LARABEE. University of Tennessee--Vegetational history of the cedar glades regions of Tennessee, Kentucky, and Missouri during the past 30,000 years.

Pollen evidence from lake sites in the Interior Low Plateaus of Tennessee and Kentucky, and from the Ozark Plateau of southeastern Missouri demonstrates that climatic conditions were favorable for establishment of cedar glades vegetation on edaphically suitable sites during warm interstadial intervals of the Pleistocene (e.g., 28,000 to 23,000 years ago) and during the past 12,500 years of the present interglacial (Holocene) interval. During the full-glacial and late-glacial intervals, between 23,000 and 12,500 years ago, cold climates and high groundwater tables may have eliminated suitable habitats for the cedar glades flora north of 34° N latitude, as boreal forests of spruce and jack pine dominated the regional vegetation. Many of the species today characteristic of the cedar glades may have persisted in northern Alabama and southern Arkansas during the full-glacial interval, and colonized more-northern sites as temperate deciduous trees also spread northward after climatic warming. During the mid-Holocene interval (8,500 to 4,500 years ago), warm, dry climates would have expanded the cedar glades habitat and allowed for increased genetic interchange among plant populations distributed between the Ozarks and the Interior Low Plateaus. Despite the climatic trend toward cooler, more mesic conditions that has favored closed deciduous forest across this region during the last several thousand years, forest openings including cedar glades may have been perpetuated by American Indians through deliberate burning.

KLIPPEL, WALTER E. University of Tennessee--Diachronic variation in mammal faunas from the Central Basin of Middle Tennessee

Mammal remains from a deeply stratified cave deposit in Middle Tennessee are described. Paleobotanical records for the region are generally congruent with variations in mammal faunal assemblages. Both faunal and floral records indicate considerable climatic change since the

full Wisconsinan. Climatically incompatible species indicate the presence of a more equable climate during the late Wisconsinan. Continental climates ushered in at the end of the Pleistocene resulted in a marked decrease in small mammal diversity as well as the extirpation of prairie and boreal species. Frequency changes in taxa throughout the Holocene reflect the mid-Holocene Climatic Optimum.

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PARMALEE, PAUL W. University of Tennessee--Contrasting late Pleistocene-early Holocene avifaunas in the Nashville Basin. Remains of approximately 60 species of birds, representing 28 families, were identified from a 4.5 m deep stratified cave deposit located along the Duck River 13 km east of Columbia, Maury County, Tennessee. Raptors were probably responsible for most of the small birds and mammals represented in the deposit. Elements of several species of northern or boreal birds such as the hawk owl, boreal owl, saw-whet owl, gray jay and pine grosbeak found in the late Pleistocene lower cave strata reflect lower annual mean temperatures than exist today and a climax vegetation dominated by conifers. The presence of prairie chicken in association with 13-lined ground squirrel and pocket gopher during the late Pleistocene - very early Holocene is indicative of extensive areas of short grass prairie and/or open savannah in the region during this period. Bird species represented in the Holocene strata comprised an assemblage similar to the one found inhabiting the region today.

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CRITES, GARY D. and EDWARD E. C. CLEBSCH. University of Tennessee, Knoxville--Woody vegetation in the inner Nashville Basin: an example from the Cheek Bend area of the central Duck River valley.

Woody stems larger than 2.5 cm dbh were sampled on 60 plots 10 x 20 m laid parallel to contour in 7 forest stands. Relative basal area and relative density data were summed to provide importance values (IV) for species. Data for species were subjected to classification (TWINSPLAN) and ordination (DECORANA) analyses. Data for species by plots were similarly analyzed. Data for the seven stands were also subjected to a hierarchical agglomerative classification technique and to ordination by principal coordinates analysis. DECORANA ordination scores for samples were related by multiple analysis of variance to geologic substrate, elevation, slope aspect, and slope steepness. Even though mature vegetation we sampled was successional unstable, its classification is consistent with field experience and its ordination reflects dominant environmental influences and recent disturbance.

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SMITH, LARRY, PAUL SOMERS, EDWIN L. BRIDGES AND PAUL B. HAMEL. Tennessee Department of Conservation--Preliminary analysis of seasonal change in Middle Tennessee cedar glade plant communities.

The cedar glades of Middle Tennessee are a unique and threatened ecosystem within the State. Our study was conducted to provide preliminary quantitative data on community composition, seasonal floristic changes and edaphic distributions of cedar glade species and plant communities. We sampled 330 $\frac{1}{2}$ m² permanent plots on ten cedar glades in the Central Basin of Middle Tennessee in June and again in September-October of 1984. On each plot we recorded percent coverage by species, soil depths, distance to edge of glade and percent coverage of seven different substrate types. Results presented here focus upon changes from early to late summer in the composition and dominance of selected species, particularly cedar glade endemics. Further analyses treat species distributions and community composition in relation to measured soil depths and substrate type and cover.

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HEMMERLY, THOMAS E. Middle Tennessee State University--Life cycle strategy of a highly endemic cedar glade species: Echinacea tennesseensis.

The Tennessee coneflower is a highly endemic species restricted to the grassy zone of certain cedar glades of middle Tennessee. Autecological studies were performed to assess its status as a component of the cedar glade ecosystem; included were seed germination, competition and allelochemic experiments. Among possible explanations for its endemism is its shade tolerance combined with the inability of its seeds to be dispersed from one open cedar glade to others nearby.

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EICKMEIER, WILLIAM G. Vanderbilt University--Photosynthetic diversity in cedar glade plants.

Elements of the cedar glade flora span the entire known range of photosynthetic pathway options. Carbon fixation examples include Calvin cycle (C₃), Hatch-Slack (C₄), and both obligate and facultative Crassulacean acid metabolism (CAM) species. This ecophysiological diversity will be briefly reviewed with emphasis on the role of CAM plants in cedar glade community structure.

MULLIGAN, TIMOTHY J. and F. DOUGLAS MARTIN. University of Maryland--Identification of white perch (*Morone americana*) stocks based on elemental composition of otoliths.

Fish otoliths are primarily composed of CaCO_3 in the form of aragonite and a protein matrix. Their crystalline lattice structure allows for the inclusion of other elements during increment formation. Otoliths of young-of-the-year white perch from six rivers flowing into Chesapeake Bay were examined using a scanning electron microscope equipped with an energy dispersive X-ray analyzer. Elements most often included in the otoliths were: Si, Al, S, Na, Cl, Mn, V, Cr, Fe, Cu, Ni, Hg and the lanthanide series elements. Stepwise discriminant function analysis demonstrated each riverine group to be distinctive; stocks could be identified with significant reliability. Greater discrimination resulted from broader geographical groupings.

LEE, DAVID S. and BROOKS M. BURR. North Carolina State Museum, and Southern Illinois University at Carbondale--Observations on life history of the dollar sunfish, *Lepomis marginatus* (Holbrook).

A large *Lepomis marginatus* population was sampled and studied sporadically from April 1980 through August 1984 in a manmade pond in Hoke County, North Carolina. Wintering adults remained in deep water, but moved to shallow water and began spawning in mid-May. Spawning peaked in late May and early June, but continued to early August. Males nested in high densities, 3-5/m², on hard sandy bottoms with minimal aquatic vegetation. Small males were generally unsuccessful in long term nest maintenance because of constant neighbor aggression. Territorial lateral displays, aggressive advances, and combats were common (5-10/min/individual), and within a few weeks all males showed damage. Successful males spawned continuously. In mid-summer many males simultaneously guarded eggs, as well as two previous broods. Approximately 150-200 fry hatched from each spawning. Females and juveniles stayed in deeper water and out of spawning beds during the breeding season. Ripe females entering spawning areas assumed pronounced, dark vertical stripes, apparently to inhibit aggressive acts by males. Within a month fry attained lengths of 10 mm SL, but most if not all young did not reach minimum breeding size (60 mm SL) until their second year. Up to six age classes have been found in the pond. *Lepomis marginatus* feed on immature aquatic insects and small crustaceans. The study pond is free of large predators, which may be the major factor accounting for this exceptionally large population.

CHANDLER, CLAY M. and GEORGE G. MURPHY. Middle Tennessee State University--Hermaphroditism in *Rana catesbeiana*.

A monoecious bullfrog was present in a large group of preserved frogs used in general biology courses at Middle Tennessee State University. A complete and well-defined male urogenital system was in the right body cavity, including a rudimentary oviduct, which is usually absent in male bullfrogs. The left side of the body cavity contained an ovary, oviduct and ureter. Both gonads had well-developed fat bodies, and each kidney had an adrenal gland. The remaining viscera seemed normal in appearance and position. The "thumb" on each forelimb was swollen, a feature usually present in male frogs, but no apertures to vocal sacs were present in the mouth cavity. Sections of the testis revealed spermatozoa in the lumen of the seminiferous tubules, and ova were seen in sections of the ovary.

YOUNG, ROBERT¹ and S. NIEMEIER². University of Mississippi¹ and Johnson County Community College²--Characterization of venoms from opisthoglyphous snakes.

The salivary secretions from three species of opisthoglyphous snakes were examined to determine toxic effects on *in vitro* physiological preparations and to compare venom protein profiles as determined by isoelectric focusing. Venom samples were collected and freeze-dried at -60 C, 10⁻² torr over P₂O₅. Species studied were the African boomslang (*Dispholidus typus*) Blandings tree snake (*Boiga blandingi*) and eastern hognose snake (*Heterodon platyrhinos*). Samples were reconstituted in appropriate saline for toxicity studies and demineralized water for isoelectric focusing. In addition to its known coagulopathic activity, *D. typus* venom (0.1mg/ml) produced a dose-dependent excitatory effect on the rat duodenum. This activity was antagonized by 10⁻⁶M atropine. *D. typus* venom had no effects on the frog sciatic nerve/gastrocnemius muscle preparation. Venom of *B. blandingi* (0.1mg/ml) induced a neuromuscular junction block which was irreversible by saline wash or ACh (10⁻⁶M), but prevented by high calcium (20mM) Ringers. Salivary secretion of *H. platyrhinos* (0.1mg/ml) produced an irreversible neuromuscular block in the frog nerve/muscle. While ACh (10⁻⁶M) and saline wash did not reverse the effect, the block was antagonized by 10⁻⁴M physostigmine. Isoelectric focusing produced profiles indicating components with pI values in the 7.5-9.5 pH range. Opisthoglyphous species generally had fewer components than did front-fanged species. This investigation suggests an additional activity of *D. typus* venom and potential toxicity of *B. blandingi* and *H. platyrhinos* on cholinergic systems.

O'Bara, Christopher J., and D. LaDon Swann, Tennessee Tech University--Small Stream fishes of the Upper Cumberland River drainage, Kentucky and Tennessee.

Faunal surveys of 150 small streams were conducted in the Upper Cumberland River drainage from the Rockcastle River upstream to the headwaters of the drainage in Letcher County, Kentucky. Collection techniques included seining, electrofishing, and snorkeling. Rare species included the least brook lamprey (Lampetra aepyptera), black-side dace (Phoxinus cumberlandensis), johnny darter (Etheostoma nigrum), and the arrow darter (Etheostoma sagitta). Species occurring throughout the drainage were the bluntnose minnow (Pimephales notatus), creek chub (Semotilus atromaculatus), white sucker (Catostomus commersoni), and the green sunfish (Lepomis cyanellus). Coal mining was the major factor in determining species composition throughout the drainage. Mining activities were classified as active, orphan, reclaimed, or inactive. Rare species, primarily Phoxinus cumberlandensis and Etheostoma sagitta, were restricted to those streams not affected by coal mining. Reclaimed mines appeared to have been effective in restoring the lotic environment so that a diverse species assemblage could be re-established. Although these reclamation methods were effective for most species, rare species populations did not become re-established in these streams. Streams influenced by active or orphan mines had a reduced fish community dominated by Semotilus atromaculatus and Lepomis cyanellus. It is evident that streams in nearly pristine conditions need to be maintained in the drainage upstream of Cumberland Falls if Phoxinus cumberlandensis and Etheostoma sagitta are to remain.

JOHNSON, AMANDA R. and KEN R. MARION. University of Alabama in Birmingham--Environmental correlates with population sizes of the flattened musk turtle, Sternotherus depressus.

A previous study of Sternotherus depressus, the flattened musk turtle, implicated siltation as a possible threat to its populations. The present study examined various environmental parameters (food availability, total suspended particulates, water chemistry, and site physical profile) in the habitats of S. depressus. All data were collected from streams in the Warrior River drainage basin in Alabama during 1983-84. Data from the measured environmental parameters are compared and correlated to estimated population size at each of six sites. Additionally, behavioral observations were performed in the laboratory to substantiate field results. Research was sponsored by the Walter F. Cox Research Fund of the Birmingham Audubon Society.

REED, KIMBERLY J. and GEORGE G. MURPHY. Middle Tennessee State University--Toxicity of eggs of the American toad, Bufo americanus.

The purpose of this study was to determine the toxicity of eggs from the American toad, Bufo americanus to vertebrate species. Females were collected during the Spring, 1984 breeding season, and preovulatory eggs collected by dissection. Acute toxicity studies were conducted to determine LD₅₀ values for mice, Mus musculus. Toxicity of jelly and non-jelly coated eggs was tested by interperitoneal injections of the homogenate, composed of eggs and 0.9% saline. The results showed that non-jelly coated eggs had greater toxicity than jelly coated eggs. The onset of symptoms, consisting of respiratory difficulty, loss of muscular control, abdominal contractions, muscular spasms, convulsions, and muscular tetany, typically occurred within 2-3 minutes and death within 5-16 minutes following injection. Ultracentrifugation of the fractionated egg showed the toxic component remained in solution after 16.25 hours at 114,000 x g. Tests are being performed to further characterize the toxin.

THIBAudeau, GISELLE and RONALD ALTIG. Mississippi State University--Yolk crystals of amphibians.

Yolk proteins of hepatic origin form distinctive crystals in vitellogenic oocytes. Measurements and images from light and scanning electron microscopy provide information that is potentially useful in taxonomic evaluations and egg identification. The shape and size of the largest crystals often were diagnostic of species and grossly consistent within higher taxa. Preservation in formalin and egg stage (ovarian, deposited, early embryo) did not affect crystal morphology, although shape and size changes occurred at later stages of embryology.

ASQUITH, ADAM. Mississippi State University--Osmoregulation of Siren intermedia. The osmoregulation of Siren intermedia stressed with hyperosmotic saline and during aestivation was studied. Blood plasma levels of Na, K, and urea rose 99.9, 190, and 320%, respectively, in animals stressed in saline, while protein levels decreased 48%. Conversely, aestivating specimens did not show significant increases in blood Na or K, while protein levels rose by 121.4%. Removal of gills did not produce a significant change in blood ion concentrations, so the primary site of ion transfer is probably the skin.

OETINGER, LIYONABAH and ADAM ASQUITH.
Mississippi State University--Behavior
patterns of Siren intermedia.

Tests to evaluate the effects of phototaxis and thigmotaxis on sociality of *Siren intermedia* were conducted. Groups of *Siren* with one shelter all hid together, but animals remained individually under "preferred" shelters when given the opportunity. When "preferred" shelters were rearranged, animals returned to their original cover most of the time. If *Siren* outnumbered shelters, the smallest individuals were often forced into the open. *Siren* chose a dark shelter without bodily contact over a clear shelter that provided bodily contact. Nocturnal activity patterns peaked two hours after the lights went off and shortly before the lights came on.

MCKEE, DOUGLAS M. Middle Tennessee State University--Preliminary survey of the fishes of the upper Stones River, Tennessee.

The ichthyofauna of the upper Stones River, a tributary of the Cumberland River in middle Tennessee, was studied. This account is based on 30 collections at 25 sites on all three forks of the river as well as their tributaries. Environmental factors used to describe the forks included dissolved oxygen, hardness, and turbidity. Habitats were characterized according to stream flow, stream order, substrate, temperature, and species composition. Methods of collection included seining and electroshocking. Presently, the survey has yielded 59 species representing 11 families. The four most dominant species in terms of numbers of individuals were *Notropis chryscephalus*, *Etheostoma atri-pinne*, *Campostoma anomalum*, and *Notropis ardens*. *Clinostomus funduloides* and *Nocomis effusus* were the only species found in first order streams in pools and bedrock riffles, respectively. *Etheostoma squamiceps* was detected in the most diverse habitats at more stations than any other species. Only a single specimen of *Fundulus notatus* was collected. No new location records have been found, however additional collections are being made.

ANGUS, ROBERT A. University of Alabama in Birmingham--Fluctuating asymmetry in pure vs. intergrade mosquitofish populations.

Fluctuating asymmetry is considered to be a measure of developmental instability. Increased levels of fluctuating asymmetry should characterize populations undergoing evolutionary "stress." Zones of hybridization between two species, or zones of secondary contact between two forms of the same species could be zones of stress if the different forms have evolved differently coadapted genomes. I compared levels of fluctuating asymmetry in pure vs. intergrade populations

of the mosquitofish, *Gambusia affinis*. The western mosquitofish, *G. a. affinis*, and the eastern mosquitofish, *G. a. holbrooki*, intergrade in the coastal Alabama region around Mobile. My objective was to determine whether intergrade populations show higher levels of fluctuating asymmetry than "pure" populations. At present, I have data for 3 populations, one each of a "pure" *affinis* and *holbrooki* population, and one intergrade population. For most of the nine characters measured, the differences in the mean asymmetry values between populations were not significant. Overall the difference between populations is barely significant. Thus, the data show only mild support for the hypothesis of greater developmental instability in intergrades. Reasons for this will be discussed.

ADKINS, M. DALE, MICHAEL L. LITTLE, JEFF LYONS, JAMES MEADOWS, DONALD C. TARTER, RANDY D. TAYLOR and BARRY WYANT. Marshall University--Electrophoretic analysis of blacknose dace, *Rhinichthys atratulus*, in two streams in West Virginia.

In West Virginia, two forms of blacknose dace, *Rhinichthys atratulus atratulus* and *Rhinichthys atratulus obtusus* are largely allopatric and separated by the Allegheny Front. *Rhinichthys a. obtusus* occur in the Ohio River drainage while *R. a. atratulus* are largely confined to the Potomac River system. In tributaries of the Ohio River drainage which are adjacent to the Allegheny Front, male blacknose dace with nuptial coloration of *R. a. atratulus* have been observed. Electrophoretic analysis is used to determine whether the population in the suggested zone of syntopy is similar to nearby populations of *R. a. obtusus* or adjacent populations of *R. a. atratulus*.

HALLY, MOIRA K. Western Carolina University--Genome Sizes and Growth Rates of Three *Desmognathus* Salamanders.

Amphibians exhibit a wide range of genome sizes (pg DNA/nucleus), even among congeneric species. Genome size is postulated to be positively correlated with nuclear volume, cell volume and length of cell cycle. Among the *Desmognathus* salamanders, several species vary markedly in adult size, yet reach sexual maturity at approximately the same age. This suggests that differences in growth rates may be linked to differences in genome size. Individuals from sympatric populations of *Desmognathus quadramaculatus*, *D. monticola*, and *D. ochrophaeus* were collected in July and August 1984, anesthetized and the hearts removed. Erythrocytes from

Desmognathus and Xenopus (standard) were smeared on each slide and were prepared by the Feulgen procedure. Nuclear densities were obtained by microdensitometry and converted to pg DNA by reference to the Xenopus standard. The observed values of pg DNA for each species are less than published values. The determined values for Desmognathus do not (conclusively) support the proposed correlation between genome size and growth rates.

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JOHNSON, DAN M. East Tennessee State University --Prey resource depletion by larval Odonata.

My colleagues (Phil Crowley, Clay Pierce, Tom Martin, Robert Bohanan, and Charles Watson) and I have used enclosure experiments to study competition among larval dragonfly populations (Insecta: Odonata) in littoral zone habitats of Bays Mountain Lake, City of Kingsport, Tennessee. Results of four separate experiments suggest that exploitation competition is not an important phenomenon in the enclosures. One kind of evidence supporting that inference is our failure to detect statistically significant reduction of prey populations in enclosures with high odonate densities. This paper will show that those results are partly attributable to the relatively low "power" of the statistical tests. Evidence from the four separate experiments is combined to improve the power of these tests. Three prey taxa are shown to be consistently depleted by odonate larvae: large Cladocera, Oligochaeta, and small Trichoptera. These taxa compose about one-third of the odonate diet; but the reduction of their densities does not appear to be sufficient to cause exploitation competition. These prey taxa may, however, be more subject than most benthic populations to regulation by odonate predation.

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MEADOWS, JAMES A. Marshall University--Ecological assessment of benthic macroinvertebrates in the Cranberry

River, Pocahontas County, West Virginia. Evident differences in water chemistry over the length of the Cranberry River are reflected in the benthic macroinvertebrate community structure. Aquatic macroinvertebrates and various physical and chemical parameters were inventoried to allow comparison among sites. Quantitative samples from seven stations were collected seasonally. Biotic indices of community

structure were derived to assess differences among sites and to describe overall stream quality. Additionally, benthos were classed into functional feeding groups to examine spatial shifts in macroinvertebrate trophic relations.

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ALLEN, BEVERLY L. and DONALD C. TARTER. Sue Bennett College, and Marshall University--Life history and ecology of Ectopectura xanthenes (Newman) (Plecoptera: Perlidae) from a small, Kentucky stream.

The life history and ecology of the stonefly Ectopectura xanthenes (Newman) was investigated in the Middle Fork of Cane Creek, Laurel County, Kentucky, between May 1983 and May 1984. Nymphs were carnivorous in their feeding habits. Generally, mayflies (Ephemerella, Ameletus, Paraleptophlebia) and dipterans (mostly chironomids) comprised the stable components of the diet during all seasons. Caddisflies (Hydropsyche), stoneflies (Hastaperla, Leuctra) and beetles supplemented the diet throughout the year. The highest percentage of empty foreguts (71.7%) occurred in summer. Length-frequency histograms indicate that the nymphal development requires two years. According to mean head width values, the greatest growth (35%) of the nymphal population occurred from February (2.47 mm) to March (3.33 mm). The chi-square test was applied to 178 nymphs and a significant deviation from the 1:1 sex ratio (0.05 confidence level) was observed. The emergence period was approximately 4½ weeks (11 June-14 July). Direct egg counts ranged from 110 to 233 per female; the mean was 170. The eggs were oval and measured 0.34 by 0.41 mm.

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SHAH, JAYSHREE and T. E. WEAKS. Marshall University--Growth potential of Spirulina major in limestone quarry water.

Spirulina major, a blue-green algae used as a human food source, was inoculated in waters of an abandoned limestone quarry near Olive Hill, Kentucky. Physical parameters including light, temperature, turbidity and conductivity were measured monthly. Seasonal phytoplankton samples were taken to establish the presence of other species. Atomic absorption was used to identify the presence of toxic heavy metals in the water. Growth limiting factors were determined using the EPA bottle assay test.

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MALCOMB, C. DALE, RANDY D. TAYLOR and DONALD C. TARTER. Marshall University--The use of STORET and the National Sanitation Foundation's Water Quality Index to develop a regionally adaptable Index of water quality.

In 1974 the National Sanitation Foundation

developed a water quality index (the WQI or NSF1) based upon chemical parameters, which demonstrated a high degree of accuracy in qualifying water conditions. The NSF1 was subsequently used in many areas, where it was found that various adaptations were necessary to maintain accuracy. This study utilizes STORET (the EPA's Storage and Information Retrieval System) to adapt the NSF1 for accurate use within West Virginia. Chemical parameters stored in this system were chosen through computer programs designed to indicate which parameters were necessary for accurate water quality analysis within West Virginia, and then to establish weighting factors for these parameters making it possible to incorporate them into the NSF1. The goal of this study was twofold: (1) to adapt the NSF1 for accurate use in West Virginia, and (2) to establish a standardized method for adapting the NSF1 to any region or state.

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SCHMIDT, DENISE A. and DONALD C. TARTER. Marshall University--The life history and ecology of *Acroneuria carolinensis* (Banks) (Plecoptera: Perlidae) in Panther Creek, Nicholas County, West Virginia.

The life history and ecology of *Acroneuria carolinensis* was studied from November 1983 until November 1984 in Panther Creek, Nicholas County, WV. Data on growth rates, feeding habits, emergence, fecundity and pH tolerance will be presented.

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COOPER, CHARLES M.¹ and LUTHER A. KNIGHT, JR.² USDA-ARS Sedimentation Lab¹ and University of Mississippi²--Coliform Levels in Moon Lake, Mississippi. Biweekly coliform counts (1982-83) from Moon Lake, Mississippi, showed a strong positive correlation to watershed runoff. Moon Lake, a 10.1 km² oxbow lake formed by the Mississippi River, receives drainage from a 166 km² watershed, most of which is cultivated in cotton and soybeans characteristic of the Mississippi River delta. Watershed drainage is accomplished through an extensive wetlands system. Fecal coliform/fecal streptococci (FC/FS) ratios were normally less than 1.0, indicating animal contamination of the system. Although fecal coliforms and fecal streptococci were periodically excessive in flow, they were not uncharacteristic of levels found in the delta where most wildlife habitat occurs adjacent to wetlands or channels. Solar radiation and aerobic conditions in Moon Lake resulted in rapid reduction in coliform numbers so that, coliform contamination did not constitute a hazard in the lake. (Partial support was provided by U. S. Army Corps of Engineers, Vicksburg District.)

97

STROHMEIER, KEVIN L. University of Kentucky--Newt predation and invertebrate community structure in a natural pond ecosystem.

I investigated the role of red spotted newts (*Notophthalmus viridescens*) in structuring the invertebrate benthic community of a fish-free pond by performing a replicated manipulation of newt densities. Newt densities were maintained at zero, 2.5, and 5 newts m⁻² using large cages, with uncaged plots as controls for enclosure effects. Invertebrates were sampled before and after treatments, sorted, counted, and when possible, identified to genus or species. Analysis of covariance indicated that the responses of prey taxa were variable: e.g. chironomid larvae sampled by inverted funnel traps decreased significantly with increasing newt density, while the cladocerans *Chydorus sphaericus* and *Pleuroxus denticulatus* did not respond significantly. Higher-level effects (e.g. species diversity) are currently being investigated.

98

Shaffer, Gary P. and Peter Cahoon. Louisiana State University, and University of British Columbia--Extracting information from ecosystems containing high spatial and temporal variability: benthic microfloral productivity.

To obtain a representative sample of benthic microfloral productivity we incubated about 1000 samples during a single month. Other environmental parameters measured were chlorophyll a, light, water temperature, mean tidal range, hours of subaerial exposure, benthic community respiration, initial dissolved oxygen, and pheophytin a / chlorophyll a. By obtaining a truly representative sample in space and in time, we were able to make direct, meaningful comparisons of four procedures: analyses of stepwise regression, principal components, time series, and multichannel information. The results from the regression analysis were misleading because the factors, though highly correlated, contained variable phase lags. The time series and multichannel information analyses, which account for variable phase lags, indicated that the system contained information peaks at 7 and 14 day cycles. The information analysis indicated that, for a long range study, considerably more information could be obtained by concentrating all monthly samples into a 14 day interval within each month. Principal components analysis enabled the elimination of variables that contained mostly redundant information.

99

BOGITSH, B.J., R.K. BARRETT and I.Y. MARSHALL. Vanderbilt University--Further observations on the acid proteases of *Schistosoma japonicum*.

Preliminary biochemical studies on the

100,000 g supernatant fraction (CEP) derived from lyophilized adult Schistosoma japonicum were undertaken as a supplement to previous studies from this and other laboratories to determine whether hemoglobinase activity is due to a battery of acid proteases. A synthetic oligopeptide was used as a substrate to further identify a thiol-dependent dipeptidyl aminopeptidase (DAP) resembling mammalian DAP I. Supplemental cytochemical studies revealed reaction product in the lipid-like globules in the gastrodermis. The CEP was also capable of hydrolyzing mouse hemoglobin. Pepstatin inhibited the reaction indicating that at least a part of the proteolytic activity of the CEP was due to a carboxyl endopeptidase. This is the first instance of a report on the presence of such proteinase activity in the schistosomes. It is probable that host globin is hydrolyzed by a battery of exopeptidases and endopeptidases that are analogous to lysosomal proteinases in other organisms. This investigation received support from the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases.

100

STUART, MICHAEL D. and G.C. MILLER.
North Carolina State University--
Oswaldocruzia sp. from the box turtle in
North Carolina.

Travassos (1917) established the trichostrongylid genus Oswaldocruzia. At that time he also gave the specific designation of O. leidy for the specimens that Joseph Leidy (1856) reported from the box turtle as Strongylus auricularis. Steiner (1924) gave the first description of O. leidy but failed to give adequate attention to spicular shape, the most reliable diagnostic character for species within this genus. Because of the inadequate description, Oswaldocruzia leidy is considered a nomen nudum. Investigations into the biology of Oswaldocruzia sp. in the box turtle in North Carolina revealed a distinct, undescribed species in that host.

101

PATTON, SHARON, J.M. JENSEN, D.G.
LOEFFLER, B.G. WRIGHT, and S.L.
STRAWBRIDGE. University of Tennessee
College of Veterinary
Medicine--Transmission and
consequences of Toxoplasmosis in
captive wild animals at the Knoxville
Zoological Park.

Fourteen marsupials from KZP died within a 24 day period. Histopathological findings were suggestive of toxoplasmosis. Lung, intestines, brain and heart were the most frequently involved organs. Blood obtained from two

kangaroos after death was positive for antibodies to Toxoplasma gondii by an indirect hemagglutination test (IHA). Six of 7 other adult marsupials living at the zoo were also positive for T. gondii antibodies. Tissues from animals that died were collected at necropsy and homogenates were inoculated into mice. T. gondii tachyzoites were obtained from mouse peritoneal fluid on postinoculation day 11. All mice died within 2 weeks of inoculation, and T. gondii tachyzoites were observed in cells on impression smears from brain, lung, liver, and spleen of these mice. Blood was collected from 12 other animals (1 elephant, 2 tigers, 3 primates, 1 camel, 2 lesser pandas and 2 binturongs). The 2 binturongs were serologically positive with IHA titers of 512 and 4,096 to T. gondii. The animal with the higher titer had become nervous and lethargic. Of 7 stray cats trapped at the zoo, one was shedding Toxoplasma oocysts and 2 others were positive for Toxoplasma antibodies.

102

STRAWBRIDGE, S.L., SHARON PATTON,
M.D. McCracken, S.R. RANDOLPH, and T.
ROBERSON. University of Tennessee
College of Veterinary Medicine--A
survey of the parasites of cats in
Knoxville, Tennessee.

Adult cats which were euthanatized at the local pound from August 1983 through October 1984 were necropsied and examined for parasite eggs, oocysts, or larvae by centrifugal flotation using Sheather's sugar solution and by Baermann technique. Blood samples collected just prior to necropsy were examined for microfilariae by Knott's technique. Of 122 cats examined, 3 or 2.5% had D. immitis in the heart. None of the cats had circulating D. immitis microfilariae; however, 2 were positive for Dipetalonema-type microfilariae. On fecal exam 32% had Toxocara cati eggs, 23% Ancylostoma, 8.2% Capillaria, 0.8% Toxoplasma gondii, 8.2% Isospora felis, 7.4% I. rivolta, 3.3% Hydatigera and 6.6% Aelurostrongylus.

103

JOY, JAMES E. and EDWARD A. GASTINEAU.
Marshall University--Larval trematodes
from the aquatic snail, Helisoma
antrosa, in Mason County, West Virginia.

A total of 360 Helisoma antrosa individuals were collected from Pond #6, McClintic Wildlife Station, Mason Co., W. Va. during an eight month period (30 March thru 18 October 1984) and examined for larval trematodes. Four different kinds of cercariae were recovered from 31 (8.6%) of these snails, and a single metacercarial type from an additional 38 (10.6%) snails. There were no dual infections. Only two of the cercariae could be identified: an amphistome, Cercaria inhabilis, found in

one snail, and an apharyngeate furcocercous, *Cercaria wardi*, also from a single snail. Two different xiphidocercariae, one without a tail fin (in 28 snails) and one with a fin (1 snail), could not be identified. A single type of metacercaria was found only in September and October. Infections were low ranging from 1 to 4 cysts per infected snail. Ten cysts were fed to each of four, day old chicks. Two chicks were necropsied after 4 days, 2 more after 5 days. No adult trematodes were recovered.

104

NELSON, CHARLES H. University of Tennessee-Chattanooga--Numerical Cladistic Analysis of Phylogenetic Relationships in the Family Pteronarcyidae (Insecta: Plecoptera).

A reassessment of phylogenetic relationships in the family Pteronarcyidae is undertaken. Eggs and nymphs of the asiatic species, *Pteronarcys reticulata* Burmeister and *Pteronarcys sachalina* Klapalek, not considered in previous phylogenetic analyses are included here. Data matrices were analyzed using the WAGNER option of the PHYLIP computer program. Wagner trees were constructed from character subsets of adult morphology, larval morphology, and egg morphology as well as from the entire character suite. The computed Wagner trees are compared to the three existing Pteronarcyid phylogenies, Nelson and Hanson (1971), Zwick (1973), Stark and Szczytko (1982), for congruence.

105

GRIMM, J. K. and J. L. GRIMM. James Madison University, and Page County High School--A study of the correlation between songbird nests and the insect fauna found in the nests.

Birdnests were collected as soon as the fledgelings vacated the nests. These nests were carefully placed in plastic bags, sealed and taken to the laboratory where examinations were made to determine the kinds of materials used in constructing the nests as well as attempting to identify the birds involved. The second phase of the study was to collect, count, and identify the arthropods found in the nests. These were then categorized into types of feeders to determine trophic relationships existing between the species of nest and the fauna living in the nest after being vacated by the fledgelings. Analysis of the data collected suggests that definite correlations do exist between the species of birds involved and certain groups of insect inhabitants, however, overlaps do exist between other species. The exposure of the nest to the elements, the vertical distribution of the nests as well as the type of materials found in the construction of the nest all seem to play a role in determining the make up of the fauna found therein. Research supported by the Max McGraw Wildlife Foundation.

106

GARCIA, JULIA. University of New Orleans Slugs as important economic pests in Central America.

Introduced slugs, *Agriolimax plebeius*, have been spreading throughout Central America since about 1967. They have become severe pests of beans (*Phaseolus vulgaris*). Research efforts have been directed at economically feasible (for peasant farmers) methods of ridding the fields of slugs. Two major investigations were undertaken (1) mechanical means (2) biological control through the use of pheromones. Prior to these studies, the life cycle and habitat parameters had to be determined.

107

CIOLINO, JANE. University of New Orleans *Helix pomatia* and *H. aspersa* - Can snails be raised in captivity for the commercial market?

The majority of snails consumed in the U.S. are imported from Europe. An effort is being made at the University of New Orleans to raise *H. pomatia* and *H. aspersa* in quantities sufficient to satisfy at least part of the American appetite for escargot. Laboratory studies include determining the effect of protein vs. fat vs. CHO diet on growth rate, habitat requirements and the effect of changes in diurnal-nocturnal cycles on reproduction.

108

JOY, JAMES E. Marshall University--Long term growth study on the Asiatic clam, *Corbicula fluminea* (Müller), from the Kanawha River, West Virginia.

Growth of 300 *Corbicula fluminea* individuals (initial shell length 10-16 mm) maintained in cages in the Kanawha River was monitored over a 40-week period (12 March thru 17 December 1983). Highest growth rates occurred in the mid-twenty °C range. Virtually no growth was recorded at temperatures of 15°C or lower. Mean clam weight had doubled by the 16th week even though almost no weight increase was observed during the first eight weeks because of cold water temperatures. Mean shell length did not double until the 34th week. Recorded increases for the entire 40-week experimental period were 107.3% for shell length, and 837.5% for weight. Twenty-five clams died during the 40-week period for a mortality of 8.3%.

109

KORGI, ALBERTO J., CHRISTOPHER J. O'BARA, and R. DON ESTES. Tennessee Technological University--Distribution of crayfish in two physiographic regions of the Cumberland River drainage.

The Cumberland River drainage consists of a number of physiographic regions which appear to determine faunal distribution of a number

of taxonomic groups. The crayfish fauna of two physiographic regions were sampled to determine distribution, possible threatened species, and geologic effects on current distribution. The Appalachian Plateau section of the drainage consists of Pennsylvanian age sandstone, shale, and coal. Streams within the plateau were sampled primarily in Kentucky from the headwaters in Letcher County to Cumberland Falls. The crayfish fauna was dominated by the genus *Cambarus* with *Cambarus robustus* the most abundant. Streams were also sampled within the Central Basin of middle Tennessee to determine any physiographic effects. The basin is characterized by Ordovician limestone and typical instream substrate consists of bedrock and large bedrock slabs. The genus *Orconectes* was dominant with *Orconectes placidus* the most common species. Although other genera do occur in both physiographic regions, it is apparent that distribution is influenced by physiographic regions.

110

UPADHYAY, J., MICHAEL J. SCHURR, and ROLAND J. LESSEPS. Loyola University--Phase contrast and scanning electron microscopy of a soil amoeba, Hartmannella glebae.

Encystment, excystment, and the sequential changes of the surface morphology of *Hartmannella glebae* were studied by phase contrast and scanning electron microscopy. The vegetative amoeba possesses a singular, hyaline, and lobose pseudopodium. During encystment there is rounding up of the trophozoite with the deposition of the wall eventually forming a thick double wall in the mature cyst. The wall is smooth in the early stages of growth, but becomes wrinkled later. No ostioles or opercula were observed. The cysts have a surface of sculptured shallow ridges giving the appearance of shallow craters. In the excystment process cytoplasmic movement is seen in the activated cysts and large refractile granules start appearing in the middle before the emergence of trophozoites. It appears that they excyst by digestion of the inner wall and not through opercula. Scanning electron micrographs revealed cup-like structures which have never been observed before in the Hartmannellidae. They are elevated from the surface of amoebae and supported by several prongs. Though the function of the cups is unknown, they may be involved in feeding.

111

MURPHREE, CHARLES S. Middle Tennessee State University--Micromorphological features of selected phalangid species (Arachnida: Phalangida (Opiliones)).

The cuticular surfaces of arachnids have detailed and sometimes unsuspected micromorphological patterns and possess diverse types of setation and sensory structures.

However, many of the finer morphological details are beyond the limits of magnification and resolution of conventional optical systems. Also a concise descriptive terminology for the "micro" level has not been established. The micromorphological features of representatives of the arachnid order Phalangida were investigated with a scanning electron microscope. The features of each specimen were photographed at relative magnifications and described utilizing available arthropod terminology. In some cases, diminutive surface features are illustrated and described for the first time. Diverse differences in cuticular patterns and setal morphologies are often apparent at the generic level. The descriptions and SEM illustrations presented in this paper provide a preliminary indication of supplemental taxonomic characters and degrees of specialization among the species studied.

112

WELLS, MARION R. and CLAY M. CHANDLER. Middle Tennessee State University--Scanning electron microscopy of the cuticle of Chordodes morgani.

Montgomery and Camerano (1898-1915) described the cuticular areoles and other prominences of this species of horsehair worm (Nematomorpha). SEM has enhanced the details of cuticular structures as revealed earlier by optical microscopy. This study shows additional cuticular features which may be of taxonomic value: spines in and around the cloacal aperture of the male, slightly bilobed shape of the male's posterior, and groove-like radiations extending from the cloacal aperture of the female.

113

NELSON, D. R., C. J. KINCER, AND T. C. WILLIAMS. East Tennessee State University --Effect of habitat disturbance on aquatic tardigrade populations.

Tardigrade populations in an East Tennessee stream were analyzed during a twelve-month study in 1979-80. The dominant species were identified and seasonal trends in population changes were determined. Subsequently, the upstream section of the creek was channelized and restructured, and large quantities of sediment and cement flowed through the collection area. In 1983 a follow-up study was initiated to assess the effect of the habitat disturbance on the tardigrade populations. Seasonal trends and species diversity remained basically unchanged; however, the relative abundance of the three most common species was significantly altered. New distribution records were established for two aquatic *Isohypsiobius* species, and some semi-terrestrial tardigrades were present but regarded as accidentals. A new species of *Isohypsiobius*, which was dominant in a preliminary sample collected in 1978, was found in very low numbers in both the initial and follow-up study.

114

STELL, PHYLLIS and WILLIAM CROWLEY.
Memphis State University, and University
of Tennessee Center for Health Sciences--
Prolactin Release in the Female Rat
Following Food Intake.

Recent studies have demonstrated a rapid release of Prolactin (PRL) in adult humans following food intake. The objectives of the present studies include: (1) characterization of the PRL release in the female rat following food intake, (2) examination of possible mechanisms involved in this release and (3) isolation of the macronutrient that may be responsible for the PRL release. Rats in all studies were ovariectomized, allowed to recover for two days and placed on a restricted feeding schedule for five days with water ad libitum. Rats were sacrificed at various intervals following the introduction of food. Serum PRL, measured by double antibody radioimmunoassay, reached a maximum concentration of 16.9 ± 2.0 ng/ml ($\bar{x} \pm SE$) fifteen minutes following the presentation of food. At thirty minutes, the serum PRL concentration had dropped to 11.2 ± 1.4 ng/ml and continued to drop reaching control levels (4.36 ± 1.2 ng/ml) between sixty and ninety minutes following food presentation. There was no significant increase in serum PRL when rats were only allowed to see and smell food. The PRL increase following feeding was partially blocked by pretreatment with the serotonin synthesis inhibitor, p-chlorophenylalanine, and completely inhibited with the opiate receptor blocker, nalmefene. Further studies were done to investigate the role of macronutrients in meal-induced PRL release. Supported by NIH grant HD-13703 and NIH Research Career Development Award (RCDA) HD-00366.

115

LAMOREAUX, WILLIAM J. and PRISCILLA S. RUSHTON. Memphis State University--The circadian rhythm of transferrin in Mus musculus and the effect of food versus photoperiod entrainment.

A chronobiological study of the plasma protein transferrin was determined using Mus musculus as a model. The study utilized the micromethod of Caraway (1963) for assaying the total iron-binding capacity (TIBC). The TIBC estimates the total concentration of transferrin present in the plasma. The study revealed that a circadian rhythm existed with a peak concentration occurring at 2000 (8pm). The peak is significantly different ($p=.05$) from all other times when comparing the means of twenty mice. Further investigation comparing three groups (one fed only during the light photoperiod, a second fed only during the dark photoperiod, and a third fed ad libitum) revealed no change in the circadian rhythm, indicating that photoperiod is a stronger environmental cue than the presence of food.

116

COOK, ROBERT EDWARD. Cornell Plantations, Cornell University--Plant demography and the recovery of endangered plant species.

The in situ conservation of threatened and endangered plant species requires a knowledge of processes (recruitment, mortality, migration) which determine population numbers. An overview of plant demography of relevance to conservation will be presented with specific examples from field studies. This will form the basis for a review of recent recovery plans for endangered plant species. Two management concepts will then be discussed: a) hierarchical research to facilitate the establishment of priorities and b) the value of sister species for testing experimental manipulations.

117

TRAVIS, JOSEPH. Florida State University--Statistical problems in studying the demography of rare plant species.

Much of the information about rare plant populations that is needed for conservation assessment or for management decisions is primarily statistical in nature, yet the relevant data are not usually of the type that are described by the standard statistical texts. In addition, a number of special problems often arise because of the need to extract the maximal amount of useful information, with limited material resources, from samples of small size. Several statistical techniques, some new and some old but unappreciated, can be used to broaden the types of inferences that can be made. Considerations about proper sampling design and the proper handling of repeated samples from the same individuals use some older results. The distributions of many demographic parameters are known, and those whose distributions are unknown can be studied with newer techniques such as jackknife estimators and bootstrap simulations. These various methods are surprisingly powerful, and their use may allow inferences to be made that once were thought impossible without prohibitively large sample sizes.

118

BASKIN, CAROL C. and JERRY M. BASKIN. University of Kentucky--Temporal aspects of seed dispersal and germination.

While the seeds of many species are dispersed at maturity, those of others remain attached to the dead, upright fruiting stalk of the mother plant for a year or more. In species with no delay in seed dispersal, time of germination is determined by changes in dormancy status after dispersal and by the environmental requirements for germination. A large

portion of the seeds of these species may germinate during the first germination season following dispersal, but persistent seed banks can occur, even in narrowly endemic species (e.g., Leavenworthia stylosa Gray). In species with a delay in seed dispersal, the season of germination is determined by time of seed dispersal, changes in dormancy status before and after dispersal and by the environmental requirements for germination.

119

SUTTER, ROBERT D. North Carolina Department of Agriculture, Plant Conservation Program--Prioritization and interpretation of demographic research on rare and endangered plant species.

The importance of demographic research in the protection of rare and endangered plant species is becoming increasingly recognized. Conservation organizations at all levels (private, state, federal), however, are limited in funding capacity, personnel and time. Matching these limitations with well-designed demographic research requires a prioritization of efforts. Presented will be a process of prioritization that includes (1) a flow diagram representing the components of a generalized life history of a perennial plant, (2) the components that need to be measured to obtain basic demographic data, and (3) the interpretation of this data, leading to (4) the prioritization of further research. Specific life history components to be discussed are breeding systems, pollinators, seed production, seed dispersal, seed banks, microsite availability, seed germination and seed predation.

120

PALMER, MARY E. North Carolina Department of Agriculture, Plant Conservation Program --Assessment of the types of monitoring in rare plant species and communities: programs and methods

In order to assess the state of the art in rare plant species monitoring, sixty programs or individuals were contacted and asked about their methods and sources of support. Monitoring projects fall into several types: inventory, survey studies, demographic studies and management experiments. These are assessed with respect to the region of the country (mainly in the southeast, northeast and midwest) and to the types of programs involved in monitoring projects. The number of monitoring projects is increasing at an increasing rate, and a large number of programs are involved in labor-intensive types of work (i.e. demographic studies and management experiments). With the increasing quantity of projects, the quality of monitoring is a matter of concern. Types of methodological problems and models are considered, and the need for a review process or consultation service for field workers and funding agencies is advocated.

121

MORGAN, SHARON W. Missouri Department of Conservation--Rare plant monitoring in Missouri.

The Missouri Department of Conservation began monitoring populations of federal candidate plant species in 1983. The goals of the monitoring program are to learn about the biology of the species and to make management recommendations for populations occurring on public lands in Missouri. Permanent plots were established in populations of seven species. These species included Lindera melissaefolium, Geocarpon minimum, Lesquerella filiformis, Trillium pusillum var. ozarkanum, Asclepias meadii, Castanea ozarkensis and Chelone obliqua var. speciosa. Individual stems were tagged and/or mapped. Data gathered varied with the species but included density, size and/or age classes, number of flowers and fruits, and survival/mortality through the growing season. At the end of the 1983 field season sampling methods and data were analyzed. Data gaps and potential problems in the life cycle of the species were determined. Some changes in sampling were made in 1984 to address these questions.

122

SOMERS, PAUL. Tennessee Department of Conservation--Monitoring rare plant populations in Tennessee.

A number of baseline studies to monitor rare plant populations have been initiated in Tennessee. The vegetation at May Prairie has been sampled for four successive years in order to determine the effects of fire management on some of the 20+ state listed rare plant taxa, mainly coastal plain disjuncts, found here. Ten cedar glades in Middle Tennessee, where many endemics, including the endangered Echinacea tennesseensis and numerous candidates for Federal listing occur, have been intensively sampled in two seasons of 1984 providing background data for documenting change in these unique ecosystems. The effects of fire and manual clipping on several rare plant populations on Roan Mountain may be detected as a result of linear transect sampling across experimental management zones on Round Bald. In the Smokies, permanent plots have been established for long term monitoring of about 15 rare plant taxa including the endemic Cacalia rugelii. At a Nature Conservancy preserve, an entire population of Cypripedium reginae has been counted and mapped for three successive years by a volunteer. These studies and additional efforts to inventory and map rare plant populations in Tennessee will be summarized.

123

RANKIN, W.T., and S.T.A. PICKETT. Rutgers University--The demography of *Buchnera americana*.

Buchnera americana L. (Scrophulariaceae) is a wide ranging herb of eastern and central North America. It is uncommon, however, throughout its range. The purpose of this study is to examine the demography of isolated populations of *Buchnera* in southern Ohio in order to determine the constraints that restrict the sizes of the populations. We tagged over 1000 plants, approximately 10 % of the populations, and have followed them for two growing seasons. One of the populations was burned the spring following the first growing season; this population showed little change during the second growing season. The size of the unburned population, however, decreased drastically in the second growing season. Recruitment to both populations was extremely low. Although it is too early to draw firm conclusions, we suspect that the persistence of *Buchnera* in southern Ohio involves cyclic fluctuations in population size, which may include a subterranean phase. This cycle is apparently responsive to environmental cues such as fire.

124

BOWLES, MARLIN L.¹ RANDY NYBOER,² MARCELLA DE MAURO,³ and MARK RACICOT.⁴ The Morton Arboretum,¹ Illinois Department of Conservation,² University of Illinois at Chicago,³ and Will County Forest Preserve District⁴--*Astragalus tennesseensis* and *Petalostemum foliosum* in Illinois: Observations on their distribution, ecology, and management.

These State-Endangered legumes were locally collected along major river valleys in northern Illinois but their populations have declined and now occur in different habitats. The remaining *Astragalus tennesseensis* station is a dry gravel bluff prairie on an Illinois River Valley terrace where the 20-25 adult plants occupy the driest part of the moisture continuum. Reproduction is occurring and the prairie is managed by prescribed burning. Several extensive populations of *Petalostemum foliosum* remain in thin-soil dolomite prairies in the Des Plaines River floodplain. Among two colonies, ramet densities were similar but genet size and densities were different, possibly due to impacts and recovery from past land use. These populations and their habitats are managed by prescribed burning.

125

JACKSON, JAMES F. University of Southwestern Louisiana--A model for adaptive ontogenetic patterning of investment in defensive structures.

Structural defenses of organisms incur costs as well as provide benefits. The relative magnitudes of cost and benefit should determine age-specific investment in structural defense. This balance was investigated by a simulation model of a cohort growing in body size and exposed to predation. The model incorporated mathe-

matical functions for resource acquisition, predator deterrence due to body size and defensive structure, and allometric growth of defensive structure. Costs and benefits associated with the magnitudes of parameters of the allometric equation were evaluated by simulation for a variety of functional relationships among the other components of the model. Under the conditions of predator deterrence likely to be most frequent in nature, the model predicts positive allometry of defensive structures. Data from diverse taxa conform to the prediction. However, comparison of the parameters of the allometric equation among dissimilar defensive structures suggests that there are developmental constraints on the optimization of these parameters when the defensive structures are morphologically complex.

126

LASALLE, MARK W. and ARMANDO A. DE LA CRUZ. University of North Carolina at Wilmington and Mississippi State University--Seasonal abundance and diversity of spiders in two marsh plant communities in Mississippi.

The spiders of two marsh communities dominated by *Spartina cynosuroides* (L.) Roth and *Juncus roemerianus* Scheele, respectively were studied from January 1982 through March 1983. Thirty-eight species of spiders (36 in *Spartina*, 33 in *Juncus*) representing 13 families were collected. The dominant species in *Spartina* included *Pirata mayaca* Gertsch, *Lycosa watsoni* Gertsch (Lycosidae), *Clubiona saltitans* Emerton, *Scotinella formica* (Banks) (Clubionidae), *Floricornis* sp. (Linyphiidae), *Dictyna sylvatica* Chamberlin & Ivie (Dictynidae), *Paramaevia hobbsae* (Barnes) (Salticidae), and *Agelenopsis barrowsi* Gertsch (Agelenidae). The dominant species in *Juncus* included *Lycosa watsoni*, *Pirata mayaca*, *Clubiona saltitans* and *Sarinda hentzi* (Banks) (Salticidae). Density, biomass, species richness and equitability peaked in May in *Juncus* and in June in *Spartina*. Peak levels of density and biomass corresponded to the reproductive activity of the common species, while levels of diversity were attributable to the activity of the least common species. Mean values of density and biomass over the study period were 84.8 spiders m⁻² and 155.6 mg m⁻² in *Spartina* and 39.4 spiders m⁻² and 133.0 mg m⁻² in *Juncus*. Species richness and density were related to the relative amount of litter in each zone. The *Juncus* zone was flooded more frequently, contained less litter, and supported lower overall density and diversity of spiders.

127

LASALLE, MARK W. University of North Carolina at Wilmington--Separating juveniles of similar looking spider species: application to ecological studies.

The identification of similar looking juvenile spiders has been problematic and often results in their consideration within a category labeled juveniles. This problem precludes any detailed consideration of

populations within a community. A technique, using tarsal claw characteristics, was used to separate juvenile spiders of a congeneric and a confamilial species pair. The number, relative size and arrangement of teeth on both the primary and secondary claws were determined from known associations of adult and juvenile stages of each species. For consistency, only the claws of leg I were used. Claws must be removed and mounted on slides to make appropriate observations. The claws of juvenile Clubiona maritima L. Koch and Clubiona saltitans Emerton (Clubionidae) were distinguishable by a combination of number (6/11 versus 5/9) and shape (straight sided versus tapered) of teeth on both the primary and secondary claws. The claws of juvenile Floricomus sp. and Eperigone serrata Ivie & Chamberlin (Linyphiidae) were distinguishable by the shape of the secondary claw (pointed versus blade shaped). Although the described species characteristics may not be identical for geographically separate populations they do serve a valuable function within communities. The benefits obtained from use of this technique far out weight the extra effort involved.

128

Hackney, Courtney T. University of North Carolina at Wilmington -- Variations of shell morphology in the carolina marsh clam, Polymesoda caroliniana (Bosc) related to geography. Shell morphology of 15 populations of the carolina marsh clam from intertidal and subtidal habitats were examined from throughout their range (Louisiana to Virginia). Differentiation between populations based on shell morphology was examined through Principle Components Analysis. Other more complex multivariate statistics yielded similar results. Some populations from the Atlantic coast were statistically different from one another, but no latitudinal relationship was evident. In fact, two populations from the same estuary were statistically different from one another. Differentiation between some populations from the Gulf of Mexico was also obtained. A population from Louisiana was statistically different from one in nearby Mississippi, but they were both similar to others from Florida and Mississippi. Comparisons of populations from both coasts found no separation of Atlantic and Gulf coast populations although several populations were statistically different from others. Using the best principle components for all populations the Louisiana population was distinct from all others. Although a variety of environmental factors were measured at each site they did not correlate with any observed group of populations.

129

REED, SAMUEL M. III. Middle Tennessee State University--A reproductive study of the white-tailed deer, Odocoileus virginianus, at the Arnold Engineering Development Center, Coffee County, Tennessee.
The reproduction characteristics of the white

tailed deer, Odocoileus virginianus, herd at the Arnold Engineering Development Center (AEDC), Coffee County, Tennessee were studied. Reproductive tracts were removed from the does killed during the November and January hunts and preserved. Fetuses were removed from the uteri and the crown-rump length measured. These measurements were used to backdate to the date of conception based on published data for known age of fetuses. Peak breeding periods of the herd were determined. Corpora lutea counts provided evidence for number of eggs ovulated which are compared to the number of fetuses present. These data are presented in light of possible modification of hunting season so as to have the least impact on reproductive success.

130

PECHMANN, JOSEPH H. K. AND RAYMOND D. SEMLITSCH. Savannah River Ecology Laboratory--Diel activity patterns in the breeding migrations of four winter-breeding anurans.

Diel activity patterns in the breeding migrations of four winter-breeding anurans (Hyla crucifer, Pseudacris nigrita, P. ornata, and Rana utricularia) were examined at a breeding site in South Carolina using a terrestrial drift fence with pitfall traps. Traps were censused at 0600, 1200, 1800, and 2400 h. during six 24-hour periods from 1982 through 1984. Census dates were selected so as to minimize rainfall and temperature differences among time intervals. Analyses of variance indicated that there were significant differences in migratory activity among time intervals, though none were detectable in either temperature or rainfall. Scheffe's multiple comparison procedure revealed that significantly more individuals migrated at night than during the day for all four species. No significant differences in activity were found between time periods within either day or night for any of the species. The presence or absence of daylight, independent of temperature and moisture effects, appears to regulate the diel pattern of migratory activity in these species. Avoidance of visual predators may be one important factor that influences these diel patterns.

131

PINDER, JOHN E., III¹ and GLENN C. KROH². Savannah River Ecology Laboratory¹ and Texas Christian University²--Insect herbivory and photosynthetic pathways in South Carolina old fields.

Three old fields of varying plant and insect composition on the U.S. Department of Energy's Savannah River Plant near Aiken, South Carolina were used to test the hypothesis that phytophagous insects avoid consuming plants possessing the C4-dicarboxylic acid photosynthetic pathway in preference to consuming plants possessing only the C3-Calvin pathway. There was little evidence to indicate avoidance of C4

species. The biomass of phytophagous insects, as determined by D-VAC sampling, was correlated with the biomass of both C3 and C4 plants. Plant biomass was estimated by quadrat sampling. The relative abundances of stable carbon isotopes in insect tissues, which can indicate whether the insects are consuming C3 or C4 plants, were consistent with those expected for consumption of C3 and C4 plants in proportion to their abundance in the plant community.

132

JACKSON, PATRICK R.¹ and JOHN E. PINDER, III². Paine College¹ and Savannah River Ecology Laboratory²--Comparisons of orthopteran species abundances through thirty years of plant succession.

Since 1951, plant succession has been studied on a several-hundred acre old field on the U.S. Department of Energy's Savannah River Plant in Aiken Co., South Carolina. The phytophagous orthopteran populations of this field were also monitored several times during the 1950's. The objectives of this study were 1) to determine the phytophagous orthopteran species present during the summer of 1984, 2) to compare the relative abundances of the orthopteran species in 1984 to that which occurred on previous plant communities, and 3) to determine to what extent the orthopteran species are grazing on the C4 grasses which have invaded the field since the 1950's. Orthopteran abundances were determined using the sweep-net procedures described for the 1950's samples. Grazing on C4 grasses was determined by measuring the relative abundances of stable carbon isotopes in orthopteran species. Although the plant community has changed dramatically in the last 30 years, relatively little change has occurred in the orthopteran populations. The species which were abundant in the mid-1950's are still abundant.

133

MILLS, EDWARD D. and J. FRANK RANDALL. Biology Department, Appalachian State University, Boone, N. C. -- Nest distribution of birds in Christmas tree plantations of *Abies fraseri* and *Pinus strobus*.

Nine Christmas tree plantations were examined for active bird nests from April 17 to September 27, 1984, in Watauga County, N. C. Thirty-two active nests were observed in Christmas trees. Of these nests 16 were occupied by *Melospiza melodia*, 5 by *Spizella pusilla*, 4 by *Spizella passerina*, 3 by *Turdus migratorius*, 2 by *Pipilo erythrophthalmus*, 1 by *Toxostoma rufum*, and 1 by *Cardinalis cardinalis*. *Pipilo erythrophthalmus*, *Toxostoma rufum* and *Cardinalis cardinalis* nested only in *Pinus strobus* while *Melospiza melodia* nested in both *Pinus strobus* and *Abies fraseri* almost equally. *Turdus migratorius* nested only

in *Abies fraseri* while *Spizella pusilla* and *Spizella passerina* nested mostly in *Abies fraseri*. This semi-artificial nesting habitat may possibly limit the number of species nesting in an area.

134

PORIES, WALTER J., ROBERT H. MAIER, PREM P. SEHGAL and STEVEN P. VANCELEAVE. Department of Surgery, School of Medicine and Department of Biology, East Carolina University--Effects of Selenium on Soybean Callus.

High concentrations of selenium in crop plants are known to be a serious hazard to the health of both livestock and human populations. More recently, the importance of selenium deficiency both in animals and human nutrition is being recognized. Our studies deal with the effects of both inorganic and organic forms of selenium on growth of soybean cotyledons and callus tissue derived from cotyledons. Callus was grown on Miller's medium. Marked inhibition occurs in cotyledons, in callus and suspension cultures in the presence of inorganic selenium ($\text{Na}_2\text{SeO}_3 \cdot 5\text{H}_2\text{O}$) at 100 μM or higher concentrations. Some inhibition is present even at 25 μM especially with suspension cultures. Seleno-DL-menthionine causes significant inhibition of growth at concentrations as low as 25 μM . Kjeldahl nitrogen data show that selenium-treated tissue contains less organic nitrogen than the untreated controls. It appears that inhibition of growth as measured by decrease in weight is related to inhibition of protein and/or amino acid/amide syntheses. Presently we are repeating our experiments with tobacco stem callus grown on Murashige-Skoog's medium. We hope to investigate: (1) the relationship between inhibition of growth and inhibition of protein synthesis; and (2) analyze the regulatory mechanisms underlying sulfur and selenium metabolism in plants.

135

MARCH, ROSLYN A.¹, DAVID L. BRAMLETT², WILLIAM V. DASHEK¹ and JOHN E. MAYFIELD¹. Atlanta University¹ and The Southeastern Forest Experiment Station². --The Timing of Fertilization In *Pinus taeda*.

Loblolly pine (*Pinus taeda*) is the major source of both commercial timber and pulpwood for The Southeastern United States. A high seed yield is dependent upon both fertilization and "normal" embryo development, two phenomena which have not been adequately examined for loblolly pine. To establish the timing of both fertilization and subsequent embryo development within this pine's life cycle, cones were collected bi-monthly from the Arrowhead Seed Orchard (Pulaski County, GA) beginning April, 1984. For each collection, cones were taken from six trees for both the 1984 and 1985 crops. Following each collection, entire scales (in some cases seed coat removed) were excised, fixed in FAA, dehydrated and embedded in

paraffin. Five to 10 μ m longitudinal sections of ovules were stained with safranin. Nucellar cavity formation was evident in late July (1985 crop). During August and September the cavity both enlarged and became spherical in shape. In the 1984 crop the female gametophyte (FG) appeared in mid-April. By mid-May, the FG extended throughout the nucellar cavity. Both archegonium and receptive vacuoles were observed within the June 1 samples. By July 1, the primary pro-embryo had formed with mid-September giving rise to late embryogeny. The results suggest that fertilization occurred the first week in June. Attempts to more precisely define the timing of fertilization through the use of sirofluor, a fluorochrome for callose, will be detailed. Supported by Grant No. 29-075 from the USDA Forest Service.

136

TOMAN, FRANK R. Western Kentucky University--A laboratory exercise combining an enzyme assay (RUBPCase) with radioactive isotope techniques.

The laboratory exercise consists of preparing a crude extract of the enzyme ribulose bisphosphate carboxylase (RUBPCase) activity by following the incorporation of ^{14}C into acid stable products. A liquid scintillation counter is used to determine the amount of ^{14}C incorporation. The enzyme extraction and assay can be accomplished during a two hour laboratory period, leaving only the actual liquid scintillation counting for another laboratory period. Principles and safety precautions of using radioactive isotopes are stressed during the laboratory exercise.

137

COFFEY, JANICE C. St. Mary's College--Laboratory activities in Environmental Biology courses.

Following a beginning semester of General Biology, our students, largely non-majors, have the option of enrolling in Environmental Biology. The laboratory and numerous outside activities are a strong component of the course. A thorough search for laboratory manuals for possible use in the course revealed no possibilities; therefore, I have constructed my own. Emphasis is placed on experimentation, long-term (i.e., more than one laboratory period) activities, and variety of experiences. The location of St. Mary's College provides possibilities that might not be available to some institutions; however, any location offers unique opportunities for study. The manual offers flexibility involving studies in populations; trophic levels; soils; radiation; noise, air and water pollution; nuclear and solar energy; and conservation of natural resources. The main purpose in the presentation of this paper is to generate discussion about what is occurring in other courses of this nature and to elicit responses to the types of activities described herein.

138

CARTER, RICHARD. Valdosta State College--Lectotypification of *Scirpus echinatus* L.

In the first edition (1753) of Species Plantarum Linnaeus described *Scirpus echinatus* based upon two distinct elements, one from the New World and the other from the Old. There are two authentic types extant representing each of these two elements. These have been identified from photographs and from the comparison of critical materials. Presently the name has fallen into disuse. The New World element is now called *Cyperus ovularis* (Michx.) Torr. and the Old world one *C. paniceus* (Rottb.) Boeckl. However, a review of the literature indicates that the Linnaean epithet should be retained for one of these two species. Evidence will be presented supporting the selection as lectotype of an authentic specimen in the Linnaean Herbarium and the application of this name to the widespread North American species which since 1836 has been called *Cyperus ovularis* (Michx.) Torr.

139

JOHNSON, GEORGE P. AND R. L. BECKMANN. North Carolina State University--The foliar flavonoids of North American *Castanea*.

The foliar flavonoids of the chinquapin chestnuts, *Castanea* section *Balanocastanon*, were investigated as part of a revisionary study. *Castanea dentata*, section *Castanea*, also was included in the investigation because of the putative hybrid between the sections, *C. x neglecta* Dode. Flavonoid analysis was performed using standard methods of paper, column, and thin layer chromatography. The results indicate that the various chinquapin taxa do not differ with respect to their flavonoids, supporting the conclusion that only one species, *C. pumila*, occurs in this section. *Castanea dentata* does differ significantly from *C. pumila*, especially in its complement of aglycones. The flavonoid profile of the hybrid was intermediate between the parental taxa.

140

BOUNDS, R. R., R. L. BECKMANN, and C. G. VAN DYKE. North Carolina State University --Taxonomic implications of seed and pollen morphology in *Rhexia* ssp.

Rhexia is a small genus of the Melastomataceae and is represented by taxa distributed primarily in the southeastern United States. Most of the taxa are diploid ($n = 11$), although tetraploids ($n = 22$) and hexaploids ($n = 33$) occur in some species or varieties. Seed and pollen grain morphologies, as described by SEM, suggest affinities among various *Rhexia* taxa. Intergradations of character states imply that hybridization

events involving *R. mariana* L. and *R. virginica* probably have affected significantly the current systematic treatments of the genus. These treatments differ primarily in the recognition of taxa either as species or as varieties. All *Rhexia* taxa, however distinctive, exhibit pollen or seed characters that overlap or intergrade either with *R. mariana* or *R. virginica*, or with an apparent close relative of these two species.

141

DOUGLASS, CAROLINE C., ROBERT E. BALLARD, and ALSTON E. HODGE. Clemson University --Flavonoid chemistry and chromosome numbers in the southeastern species of *Waldsteinia* Willd. (Rosaceae).

In preparation for the treatment of *Waldsteinia* for the Vascular Flora of the Southeastern United States, the flavonoid chemistry of *W. lobata* (Baldwin) Torrey & Gray and *W. fragarioides* (Michaux) Trattinick is examined. There is a marked similarity in the pattern of flavonoid compounds. *W. lobata* is an endemic to the Piedmont of Georgia and South Carolina (Robertson, 1974) and is listed as a threatened species in these states. Its distribution exhibits a strong correlation with the Brevard Belt of the Southern Appalachians. *W. fragarioides* has been divided into northern and southern subspecies by Hedwig Teppner (1968) in his world-wide revision of the genus: *W. fragarioides* ssp. *fragarioides* and *W. fragarioides* ssp. *Doniana* (Tratt.) Teppner, respectively. The chromosome counts for *W. lobata* and *W. fragarioides* ssp. *Doniana* were not included in Teppner's dissertation and hereby are reported as $n = 14$.

142

FAIREY, JOHN E., III, CAROLINE C. DOUGLASS, and DAVID W. BRADSHAW. Clemson University--Preliminary observations on transplants from the basin of the Richard B. Russell Lake.

Plants of eight species considered to be disjuncts or rare or on the S.C. list of endangered and threatened plants were transplanted onsite at Deal Creek, Abbeville Co., S.C., and offsite at the Clemson University Horticultural Gardens. Transplants have been monitored for three growing seasons, and success of the various transplants has been correlated with weather conditions. Size, the number of leaves, and flowering or fruiting individuals have been used as indicators of success of the various transplants. *Aruncus dioicus* (Walt.) Fern., *Panax quinquefolium* L., and *Trillium cernuum* L. were moved upslope at Deal Creek to a natural preserve above the highwater level of Lake Russell. Initially *Trillium* appears to be more successful with a number of transplants exhibiting a robust habit. *Aruncus* and *Panax* are persisting and are somewhat depauperate. Several transplants have disappeared. *Arisaema*

dracontium (L.) Schott., *Aruncus*, *Dodecatheon media* L., *Lithospermum tuberosum* Rugel ex DC., *Pachysandra procumbens* Michx., *Panax*, *Trillium cernuum* and *T. discolor* Wray were transplanted to the wildflower area of the Gardens at Clemson. This is a managed natural area with an irrigation schedule. Generally, these transplants seem to be more successful and exhibit a more robust growth form.

143

MALONEY, ANN C. and DAN K. EVANS. Marshall University--A taxonomic study of local populations of *Carex Jamesii* Schweinitz and *Carex Willdenowii* Schumacher (Phyllostachyae: Cyperaceae) in the Ohio River Valley.

Seven local populations of *Carex Jamesii* and six of closely related *C. Willdenowii* were characterized and compared to determine if reliable differentiation of the two taxa may be made via morphological and anatomical evidence. Qualitative morphological analysis based on internal and epidermal examination of the lamina shows that presence or absence of adaxial papillae is an excellent delimiter; *C. Jamesii* has few or no papillae, while *C. Willdenowii* is densely papillate. Quantitatively, 20 morphological characters were examined for each of 318 mature collections. Stepwise discriminant analysis was performed with and without classification as to proposed species. Analyses show that *C. Jamesii* and *C. Willdenowii* may be reliably separated on the basis of achene width, number of perigynia per spike, and pistillate scale width. Eight of the 13 populations were quantified anatomically using 12 internal leaf characters, and data analyzed by stepwise discriminant analysis, with and without classification as to proposed species. Separation of the taxa was incomplete when using internal anatomical characterization.

144

PRESMYK, CATHERINE J. Southern Illinois University at Carbondale--The effect of wildfire and clearcutting on woody species regeneration in the Ozark Hills of Southern Illinois.

Regeneration of woody species under a forest clearcutting/fire regime was studied in the Ozark Hills of Alexander county, Illinois. The 45 ha study area included four treatments; a nine year old clearcut burned four years ago, an unburned four year old clearcut, a mature oak-hickory forest burned four years ago, and an undisturbed mature oak hickory forest. Twenty 0.04 ha circular plots were randomly located in each treatment to measure woody species density and basal area. Density was not significantly different between clearcut sites and forested sites. However, burned sites did exhibit a significantly ($p < 0.05$) higher density with 38,738 stems/ha compared to 31,713 stems/ha on the unburned sites. Density in the burned

forest was 43,713 stems/ha, almost twice that of the unburned forest. Forty-five woody species (not including vines) were found in the plot samples. Relatively large numbers of both Quercus alba and Quercus velutina were present across the study area and regenerated primarily by sprouting. Q. alba densities were 2,025, 2,162, 1,288 and 450 stems/ha for the burned forest, burned clearcut, forest and clearcut while Q. velutina densities were 2,625, 1,150, 1,238 and 400 stems/ha. As a result of cutting and burning treatments, various woody species exhibit regenerative patterns.

- 145 CONNER, WILLIAM H. Louisiana State University--Natural regeneration in a Louisiana swamp.

With the large reserves of cypress in the southeastern United States, logging of cypress is once again becoming attractive. With this increased logging, a need for long-term management exists. However, very little is known about the silvicultural aspects of cypress. Four logged areas were sampled to determine the vegetation characteristics of the stands and the recruitment, survival, and growth of cypress seedlings and coppice regeneration. Coppice regeneration was prolific during the first year after cutting, but most of the sprouts died in the following years. In addition, seedling recruitment was very poor. Use was made of a water budget computer program in order to compare hydrologic variables since 1914 with the physioecology of cypress regeneration. Even though 1980-1981 was a dry period, no seedling recruitment occurred. Indications are that changing hydrologic patterns in the swamp are leading to longer flooding events, and that natural regeneration may not be sufficient to regenerate stands of cypress.

- 146 FEIL, ELISABETH G. University of North Carolina at Charlotte--Vegetation of Chimney Rock Park, Rutherford County, North Carolina.

The vegetation of the Park covering approx. 180 hectares of mostly steep terrain was described. The major rock formation is Henderson Augen Gneiss. It forms spectacular cliffs on both sides of the gorge which cuts through the Blue Ridge Escarpment. Aspects are northerly and easterly, and the climatic conditions are strongly influenced by the prevailing NW winds and a 122 mm water-fall. Major areas of the Park have been largely undisturbed for more

than 50 years. 17 community types were sampled by the quarter-point method and by relevés, several others of lesser extent were described. Soils were classified to series level when possible. A vegetation map was developed for land use management and to aid in further research. Community types include Quercus prinus/Rhododendron minus on steep north ridges and Fraxinus americana/Carex biltmoreana on seepage ledges, mostly on mica schist. Of the rare species Scirpus cespitosus var. callosus and Lycopodium selago are of special interest at 600-700 m elevation. In general, the presence of moisture is the most important factor in the distribution of plant species and community types.

- 147 CARTER, M. ELOISE BROWN. Emory University--Differential production of asexual propagules in Talinum mengesii and T. teretifolium.

The formation of succulent propagules (ramets) on senescing stem tips is an effective means of asexual reproduction in Talinum mengesii and T. teretifolium. Ramets remain attached to the dead, dry stem of the parent plants until spring when they establish roots, grow and begin flowering by mid-June. Ramets also may drop freely to the soil surface and be dispersed by water. The ability to produce ramets varies between and within populations of T. mengesii. All plants of four populations which were sympatric with T. teretifolium produced an average of 15.28 ramets per stem, while only 41% of the plants in four allopatric populations produced 2.07 ramets per stem. Three allopatric populations did not produce asexual propagules. In eight populations of T. teretifolium, an average of 4.5 ramets per stem were formed by 85% of the plants. Greater ramet production may provide a competitive advantage to T. mengesii where it occurs on the same outcrop with T. teretifolium.

- 148 MACKENZIE, MARK D. and PAUL A. DELCOURT. University of Tennessee--An analysis of present forest composition in eastern North America based on continuous forest inventory data.

Growing stock volume data from 1742 continuous forest inventories were summarized for 38 genera. These inventories were taken by the United States and Canadian Forest Services over the past 25 years. These data were then classified using TWINSPLAN, a polythetic divisive classification technique. The first division of this classification split the samples into a temperate and a boreal zone. The temperate zone was further divided into 10 vegetation types. Pinus and

Quercus were dominant in the southern types, and Quercus, Acer, Carya, and Populus were dominant in the northern types. The boreal zone was subdivided into five types with Picea, Abies, Betula, Populus, and Acer as dominants or codominants within these types. DECORANA ordination was used to indirectly determine environmental gradients underlying the distribution of genera and to examine variation within and between vegetation types.

149

McOERMAN, WILL W. Mississippi Museum of Natural Science--Nectar production and pollinator foraging response in *Zigadenus glaberrimus*.

Sexual function on protandrous self-incompatible flowers of *Z. glaberrimus* is temporally isolated by a 24-48 hour interval between the male and female phase. Sexual differentiation in the components of nectar secretion was assessed by comparative measurements of nectar volume, concentration, amount of sucrose, and rate of secretion. Numbers of staminate and pistillate flowers visited by pollinators were recorded and compared to predictions of random or preferential foraging. Staminate flowers produced significantly more sugar (mg/flower) than pistillate flowers ($p < .005$). Sugar (mg/flower) did not accumulate with time (0800-1600) on staminate flowers sampled throughout the extensive population. Staminate sugar did increase, although the rate was low, when the sample was restricted to homogeneous rhizomatous colonies (all regressions significant, $p < .01$). The proportion of staminate and pistillate flowers varied between colonies due to phenological schedules. In eight 10 m² plots, the M:F ratio ranged from .49:1 to 1.33:1. The M:F visitation ratio by honey bees was significantly different from that expected by random foraging in all eight plots (chi-square = 1805, 7 df, $p < .001$). The M:F visitation ratio was related to the M:F flower ratio ($r^2 = .83$, $p < .001$). Oata on the black thread-waisted wasp (*Isodontia philadelphia*), though less conclusive, indicated a preference for staminate flowers. Seed set does not appear to be limited by staminate biased foraging behavior.

150

BUSING, RICHARD T. and EDWARD E. C. CLEBSCH. University of Tennessee --Canopy-understory interactions in a southern Appalachian spruce-fir forest.

The influence of canopy trees on tree regeneration was studied in a *Picea rubens*-*Abies fraseri* forest of the Great Smoky Mountains. Spatial distributions of *P. rubens*, *A. fraseri* and *Betula lutea* seedlings (≤ 2.5 cm dbh) and saplings (> 2.5 to 12 cm dbh) were related to the influence of canopy trees (> 12 cm dbh) of these same species using the indices of Woods (1979). Rank-sum tests comparing the distributions of index values for pairs of understory species yielded the following results. No statistically signifi-

cant species-specific canopy-understory interactions were revealed for the seedling groups tested. In contrast, saplings did show some species-specific responses to canopy trees. Highly significant differences in the distributions of *P. rubens* and *A. fraseri* saplings with respect to 1) *P. rubens* and *A. fraseri* canopy trees, and 2) *P. rubens* and *B. lutea* canopy trees were revealed. Also, significant differences in the distributions of *A. fraseri* and *B. lutea* saplings with respect to 1) *P. rubens* and *A. fraseri* canopy trees, and 2) *P. rubens* and *B. lutea* canopy trees were revealed. In all of these cases *A. fraseri* saplings had an affinity for *P. rubens* canopy trees. Tree replacement patterns were inferred from these canopy-understory relationships and were found to compare favorably with observed gap phase tree replacement trends.

151

BUSING, RICHARD T. and EDWARD E. C. CLEBSCH. University of Tennessee --Development and application of a southern Appalachian spruce-fir forest succession model.

A gap model modified from the FORET model of Shugart and West (1977) was developed to simulate stand dynamics of a spruce-fir forest in the Great Smoky Mountains. As in FORET, recruitment, growth and death of individual trees on a gap sized tract is calculated and tabulated annually. The model was modified for seven arboreal species common to the spruce-fir zone. In addition, recruitment algorithms were developed to simulate observed spatial relationships between incoming seedlings and canopy trees. The model was designed for studies of disturbances involving the decline of red spruce and/or Fraser fir populations. It has been applied to predict future stand composition and dynamics under a variety of potential levels of disturbance.

152

DAY, ANDREW J., MICHAEL L. SCOTT and REBECCA R. SHARITZ. Savannah River Ecology Laboratory --Herbaceous biomass and stem density differences along a thermal gradient in a cypress (*Taxodium distichum* L.)-tupelo (*Nyssa aquatica* L.) wetland.

Stem density and aboveground biomass estimates were developed at three sites along a thermal gradient in a cypress-tupelo wetland to assess the response of herbaceous vegetation to tree canopy mortality and elevated substrate temperatures. The density and biomass of herbaceous vegetation varied markedly along the thermal gradient. At the most perturbed site only 0.8% of the herbaceous biomass was found on the most common substrate type (loose muck). In contrast, 51% and 53% of the herbaceous biomass occurred on loose muck at the intermediate and least perturbed sites, respectively. Across all

substrate types, the intermediate site had the highest stem densities (946 ha⁻¹) and biomass (251 gm ⁻²). The low percentage of biomass on loose muck at the perturbed site is presumably due to the unsuitability of this substrate because of its high temperature. Increased stem density and enhanced production of standing herbaceous biomass at the intermediate site likely resulted from the lack of thermal limits on plant establishment and growth and the opening of the canopy.

153

SCOTT, MICHAEL L., JACQUELINE L. HASKINS and REBECCA R. SHARITZ. Savannah River Ecology Laboratory -- Density, biomass and patterns of mortality of cypress (*Taxodium distichum* L.) knees in a thermally disturbed swamp.

In a cypress-tupelo swamp receiving thermal effluents, cypress (*Taxodium distichum*) exhibit increased mortality along a gradient of increasing water temperature and siltation. It has been hypothesized that cypress knees function in mechanical support or in aeration. Because these cypress may be exposed to mechanical stress or to low oxygen levels in the substrate, we investigated knee density, biomass and mortality relative to cypress stem density along this disturbance gradient. We described three locations subject to varying degrees of stress: high, intermediate, and no discernable impact on canopy closure. At the warmest location no cypress stems remained; knee biomass and density were significantly lower than at the intermediate site; and knee mortality was 100%. Stem abundance fell significantly from the cool to the intermediate site, but knee biomass and density did not differ significantly. Although overall knee/stem ratios increased from the cool to the intermediate site, live knee/live stem ratios showed little change. This suggests that the increase in total knees per stem does not indicate increased knee production by stressed stems, but instead may indicate that stems are lost from the canopy more rapidly than are the associated knees from the substrate.

154

MUZIKA, R.M.¹, J.B. CLADDEN², J.D. HADDOCK¹ and D.M. WATERS¹. Savannah River Ecology Laboratory¹ and Savannah River Laboratory -- Wood production in wetland tree species.

Annual wood production was estimated for several wetland tree species growing in undisturbed and post-thermal recovering sites on the Savannah River Plant in South Carolina. Average wood biomass increments were estimated by applying biomass:DBH relationships to 10 year radial growth data obtained by tree coring. Average wood biomass increase ranged from <0.1 to >10 kg/tree-year and production was positively related to tree size,

in general. However, wood biomass increase calculated as a percentage of standing biomass decreased with increasing tree size, indicating an asymptotic pattern of tree growth. Cypress (*Taxodium distichum*) growth was greater in stream versus riverine floodplains. Willow (*Salix* spp.) growth showed no trends related to floodplain type.

155

MITCHELL, CLAUDIA E.¹, GEORGE T. WEAVER² and PHILIP A. ROBERTSON². Savannah River Ecology Laboratory¹ and Southern Illinois University at Carbondale² -- Changes in calcium levels in foliage, stems and roots during autumnal leaf senescence of *Quercus prinus* L. grown under two soil moisture and calcium regimes.

Previous studies suggest discrepancies in trends of calcium movement in plants. Although not considered a phloem-mobile element, calcium may move in the phloem under certain conditions. To determine the effects of environmental conditions on calcium behavior during leaf senescence in *Quercus prinus* L., seedlings were grown under two soil moisture and calcium levels for one growing season. Representatives of each treatment were harvested before and during leaf senescence and after leaf fall. After adjustments for dry weight changes, foliar calcium concentrations of seedlings grown under high moisture conditions decreased from 17,600 µg/g before leaf senescence to 14,922 µg/g after leaf fall. Decreases in foliar calcium in *Quercus prinus* L. may indicate resorption of calcium during leaf senescence under high moisture conditions. Calcium mass of stems and twigs did not change. Calcium mass of roots decreased from 20,035 µg/g to 14,376 µg/g under low moisture conditions and increased from 18,305 µg/g to 22,646 µg/g then decreased to 18,061 µg/g under high moisture conditions. Decreases in root calcium mass indicate that there may not be an internal sink for resorbed calcium. Loss of calcium through roots may be an alternative mechanism for maintaining calcium levels in soils on litter-free sites.

156

SCHNEIDER, REBECCA L. and REBECCA R. SHARITZ. Savannah River Ecology Laboratory -- Soil seed banks in a southeastern palustrine wetland.

Soil seed banks are essential to the maintenance of natural plant communities and to the regeneration of damaged systems where the standing vegetation has been removed. Over the past decade, seed reserves have been examined in the soils of a number of aquatic habitats, however, not in riverine swamps. These systems differ from lakes, ponds, and marshes in being forested, having unidirectional water dispersal, and annual fluctuations in water level. Using germination and sieving techniques, we described the soil seed banks before and after winter

flooding in a cypress - tupelo swamp and on an elevated hardwood island located along the Savannah River in South Carolina. Composition of the woody seed bank was found to be relatively stable on an annual basis and similar to the standing vegetation in both communities. Composition of the herbaceous seed bank was more dynamic, increasing in seed density after fall seed dispersal but then decreasing after the winter river flooding of the two communities. Seed banks of the two communities were found to be dissimilar despite their proximity. Water dispersal appears to have a minor impact on the composition of the seed banks in these palustrine wetlands.

157

PINDER, JOHN E., III, ALICE C. DOSWELL, DOMY C. ADRIANO, THOMAS G. CIRAVOLO AND DONALD M. YEHLING. Savannah River Ecology Laboratory--The interception, retention and redistribution of Pu-238 deposition in the canopy of orange trees.

Spacecraft, such as Pioneer and Voyager, which travel to the outer planets depend upon Pu-238 fueled, thermocouple devices called radioisotope thermoelectric generators (RTG) for electrical power. Because of the remote possibility that an accident during launch could disperse RTG fuel into the atmosphere over central Florida, we have been conducting research on the potential ingestion of Pu-238 by man following the deposition of Pu-238 onto orange tree groves. A number of studies involving the exposure of orange trees in simulated groves to Pu-238 deposition have been conducted on the U.S. Department of Energy's Savannah River Plant near Aiken, S.C. Orange trees intercept a relatively small fraction of Pu-238 deposition but retain at least half the intercepted Pu for 40 days. Fruit surfaces are more efficient than leaf surfaces in retaining Pu, and the Pu-238 content of fruits could slowly increase following the initial deposition due to the loss of Pu from leaf surfaces and subsequent interception and retention on fruit surfaces.

158

HODGE, ALSTON E. CLEMSON UNIVERSITY--Ecological Characterization of Herbaceous Dominated Carolina Bays of the Upper Coastal Plain of South Carolina

Ten herbaceous Carolina bays of the southwestern upper coastal plain of South Carolina (Aiken and Barnwell Counties) were studied over a one year period and characterized in terms of their plant community arrangement and composition, hydrology, geology, and edaphic conditions. The vegetation of some selected bays was described as concentric patterns of distinct community types resulting from discing or cultivation practices in the past. In other bays, differences in

community type arrangement and composition could be correlated to changes in soil types, hydroperiod amplitude, and frequency of fire. Vegetation maps were prepared for selected bays from infrared and panchromatic aerial photographs. Detrended correspondence analysis (DCA) ordination of vegetation sampling data supported the designation of distinct community types in some bays.

159

KOVACIC, DAVID A. and JACK S. ERWIN. Savannah River Ecology Laboratory--Mineralization and nitrification potentials of coastal plain forest habitats along a moisture gradient.

Mineralization and nitrification potentials were measured in forest soils along a moisture gradient which included turkey oak/longleaf pine, longleaf pine, upland deciduous, bottomland deciduous and cypress swamp habitats. Methods involved nitrate analyses of soils following incubations of 1, 2, 4 and 5 weeks. Nitrification was negligible in all but the swamp soils which increased from $5 \mu\text{g g}^{-1}$ to $30 \mu\text{g g}^{-1}$ nitrate-N after 5 weeks of incubation. Ammonium formation was negligible in the turkey oak/longleaf pine and longleaf pine soils; however, it increased from $5 \mu\text{g g}^{-1}$ to $10 \mu\text{g g}^{-1}$ ammonium-N in both the upland deciduous and bottomland deciduous soils after 5 weeks of incubation. Swamp soil ammonium-N levels decreased from $40 \mu\text{g g}^{-1}$ to $10 \mu\text{g g}^{-1}$ following 5 weeks of incubation. Results support the premise that deciduous ecosystems recycle more nitrogen through the plant-soil component than do coniferous ecosystems. Results also indicate a high nitrification potential in swamp soils. Such high nitrification levels could result in high nitrate losses following swamp ecosystem disturbance.

160

Osborn, T.R., Sasser, C.E., and J.G. Gosselink. Louisiana State University. --The Measurement of Diversity in Louisiana Marshes.

Marsh vegetation biomass data was compiled and used to quantify diversity, evenness, and richness for fresh, intermediate, brackish and saline marshes in southeast Louisiana. Each marsh was dominated by one plant association with the exception of the intermediate marsh. The intermediate marsh, dominated by two plant associations, was the most diverse, followed by the fresh, brackish, and saline marshes in descending order of diversity. Diversity was found to be influenced by the number and type of plant associations dominant within each marsh. Previous studies have been based upon qualitative observations and generally found diversity to decrease with increasing salinity levels.

161

OE LA CRUZ, A.A.,¹ E.D. GOMEZ,² O.H. MILES,¹ G.B. CAJIPE,² and V.B. CHAVEZ.² Mississippi State University¹ and University of the Philippines²--Toxicants from Mangrove Plants: I. Bioassay of Crude Extracts.

Water, petroleum ether, and ethanol extracts from the mangrove plants *Aegiceras corniculatum*, *A. floridum*, *Derris trifoliata*, *Excoecaria agallocha*, and *Heritiera littoralis* were tested against *Lilapia* spp. Toxicity was based on 100% mortality determined with a 24-hour "quick screening" bioassay of 5 fish in 2-liter glass tanks without feeding and aeration. Extracts of certain plant parts showed toxicity with *Oeris* exhibiting the highest toxicity to test animals by killing within 4-8 min (1 ppt aqueous extract), 6-9 min (0.1 ppt petroleum ether extract), and 20-40 min (0.1 ppt ethanol extract). The plant materials retained their toxicity after air-, oven-, and solar drying.

162

WOODS, MICHAEL. Southern Illinois University at Carbondale--The vascular flora of Calloway County, Kentucky.

A survey of the vascular plants of Calloway County, Kentucky, was conducted from April 1981 to March 1983. A total of 912 specific and infraspecific taxa representing 428 genera and 119 families were found to occur within Calloway County. Of these, 17 species have been listed as endangered or threatened in Kentucky. The Asteraceae represented the largest family with 135 taxa. Poaceae and Cyperaceae were the next largest families with 112 and 58 taxa, respectively. *Carex* represented the largest genus with 32 species. The author would like to express his appreciation to the Floristic Survey Committee of the Kentucky Academy of Sciences for awarding a grant to help defray the expenses of carrying out this project.

163

PATRICK, THOMAS S. and H. R. DeSELM. University of Tennessee, Knoxville--Floristics of an East Tennessee cedar barren.

A few specialized plant communities in the Southeast are little described in botanical literature. Details of their physiognomy, flora, and origin remain viable subjects for ecological research. Cat prairies or cedar barrens - areas with many perennial grasses, legumes and composites, as well as scattered redcedar (*Juniperus virginiana*) - are well developed in the Ridge and Valley Province of East Tennessee. Species found on a newly discovered cedar barren were grouped into floristic components. Taxa with mountain and coastal plain affinities were few in comparison to those with intraneous ties,

but prairie peninsula remnants, some of which also occur in cedar glades of the Interior Low Plateaus Province, were fairly conspicuous. Among the more critical plant discoveries are *Celtis tenuifolia*, *Solidago ptarmicoides*, *Liatris cylindracea*, *Psoralea onobrychis*, *Delphinium exaltatum*, *Silphium terebinthinaceum*, *Helianthus occidentalis*, *Quercus prinoides*, *Tomanthera auriculata*, and *Houstonia nigricans*. The persistence of the community is enhanced by edaphic features, past land usage, and, hopefully, appropriate management. Although endemism is absent, taxonomic problems are evident in the genera *Houstonia* and *Liatris*. Other cedar barren floras in East Tennessee tend to augment the real botanical significance of the cedar barren plant community.

164

TAYLOR, ROSANNAH¹, WILLIAM V. OASHEK¹, WALTER C. SHORTLE² and JOHN E. MAYFIELD². Atlanta University¹ and The Northeastern Forest Experiment Station². --Polyphenol Oxidase in *Coriolus versicolor*.

Ocay fungi, the causative agent of white rot, are responsible for the degradation of lignin, cellulose, and hemicellulose, the three major components of wood. Fungi such as *Coriolus versicolor*, that are able to degrade lignin generally exhibit extracellular polyphenol oxidase activity. Previously, we showed that there was a marked difference in both the light and electron microscopical morphologies of *C. versicolor* following its treatment with catechol, a phenolic compound, 3 and 13 days after inoculation in a 16 day time course. In addition, mycelial dry weight was reduced at day 16 when catechol was added at days 0-6 but was not if supplied at days 10-13. We have been attempting to determine the biochemical mechanisms underlying these time-dependent responses. One manifestation of these mechanisms might be the occurrence of extracellular polyphenol oxidase. Here, we report preliminary data regarding the assay conditions for the enzyme. Both intracellular and extracellular enzyme for 10 and 13 day cultures could be detected at 30°C and pH 5.0 provided that catechol was utilized as a substrate. Results from an in progress time course (0-16 days) regarding a possible relationship between intracellular and extracellular polyphenol oxidase will be reported. A possible effect of naturally occurring phenolics on both this relationship and the enzyme's activity will be presented also. Supported by Grant No. 23-818 from the USOA Forest Service.

165

TAWILA, SALEM¹, WILLIAM V. DASHEK¹, WALTER C. SHORTLE² and JOHN E. MAYFIELD¹. Atlanta University¹ and The Northeastern Forest Experiment Station². --Effects of Catechol on the Ultrastructure of *Poria obliqua* and *Phialophora melinii*.

Phenolic compounds have been considered as the primary factor in the natural resis-

tance of wood to deterioration as well as an inhibitor for the growth of certain decay fungi, e.g., *Poria obliqua* in culture. Non-decay fungi such as *Phialophora melinii* are not susceptible to phenolic compounds. The latter generally increase after either injury or infection. Here, we compare the effects of catechol, a model phenolic compound, upon the ultrastructures of *P. obliqua* and *P. melinii* in order to understand this inhibition. Catechol (1mg/ml) was added to culture media prior to inoculation and at 3, 6, 9 and 12 days post inoculation. One and three hours after the addition of catechol, mycelia were fixed for 0.5 hours in 3.0% glutaraldehyde buffered with pH 7.4, 0.1 M cacodylate buffer, washed with buffer, post-fixed for 2 hour in pH 7.4, 0.1 M cacodylate buffered 2% O_5O_4 . The fixed and post-fixed mycelia were dehydrated and embedded in Spurr's. Examination of their sections revealed an enhancement in electron density in mitochondria, alterations in mitochondrial profiles and the occurrence of large vacuoles of *P. obliqua*. Although there were few ultrastructural alteration in the sub-cellular organelles of *P. melinii*, microbodies were present. The catechol-induced changes in the ultrastructure of both decay and non-decay fungi will be discussed in terms of inhibition and resistance, respectively. Supported by Grant No. 23-818 from the USDA Forest Service.

166

FREDERICK, L.¹, IVAN L. ROTH², and LEVESTER PENDERGRASS³ Howard University¹, University of Georgia² and U.S. Forest Service, Range Timber and Wildlife Division³--Studies on the nature of the "peridial platelets" of *Clastoderma debaryanum* sporangia.

Persistent "peridial platelets" that adhere to the ends of capillitial branches represent a key diagnostic feature of the genus *Clastoderma*, an acellular slime mold. We have investigated the nature of the "peridial platelets" in *Clastoderma debaryanum* with scanning electron microscopy and have found that these sporangia platelets are parts of the capillitial system instead of being parts of the peridium. Platelets originate from flared ends of capillitial branches that expand into oval to elongate, flattened, anastomosing segments in the outermost region of developing sporangia. Platelets have a smooth to slightly pitted outer surface and an under-surface that consists of an irregular pattern of veins and cavities. The entire system of capillitial platelets is at first enveloped by a thin, membranous, transparent, evanescent peridium. When the sporangium matures the peridium disappears except for a collar-like remnant that persists at the top of the stalk. (Study conducted in Department of

Microbiology, University of Georgia and was partially supported by NIH-MARC Faculty Fellowship to senior author.)

167

REESE, WILLIAM DEAN. University of South-western Louisiana--Tropical lowland mosses (Musci) disjunct between Africa and the Americas.

Approximately 15 species of mosses appear to be disjunct between the tropical lowlands of Africa and America. One of them, *Calyptothecium planifrons* (Ren. & Par.) Argent is reported new to the Western Hemisphere based on two recent collections from the Amazon Basin of Brazil. Mosses are regarded as having slow rates of evolution and it is possible that some or all of the disjunctions are a consequence of continental movements that divided original populations, with subsequent lack of evolutionary divergence. It is likely that some or all of the species discussed will prove to have wider distributions in the tropics when world-wide revisions are performed.

168

SUNDBERG, WALTER J. Department of Botany, Southern Illinois University at Carbondale. --An unusual ultrastructural modification in the nuclear envelope of *Mycena citricolor* (Tricholomataceae, Agaricales).

Glutaraldehyde-osmium fixed material has revealed the occurrence of an ultrastructurally modified region of variable length in the nuclear envelope of premeiotic and zygotene basidial nuclei of *Mycena citricolor* (Berk. & Curt.) Saccardo. Usually seen in association with and adjacent to the nucleolus, this modified region appears nearly identical in cross section to the modified endoplasmic reticulum that forms the typical Basidiomycete septal pore cap. Like the septal pore cap, the modified nuclear envelope is distinctly five parted, consisting of (a) a tripartite outer (cytoplasm associated) membrane, (b, c, and d) an intermembranal space divided into three parts by a central electron dense band, and (e) a tripartite inner (nucleoplasm associated) membrane. The electron dense layers of the tripartite outer membrane appear uniform and more or less symmetric. However, the inner membrane is distinctly asymmetric--the inner (nucleoplasm associated) of the two electron dense layers is noticeably thicker and denser. It remains to be determined whether or not this ultrastructural modification of the nuclear envelope occurs at other stages of basidial development and in other segments of the basidiome or the mycelium.

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ASB Candidates for Office—1985

The Nominating Committee, composed of Grover C. Miller, James L. Riopel, and Chair Margaret L. Gilbert, has selected the following slate of nominees for the ASB offices to be filled this year. Additional nominations will be received from the floor. Voting will take place at the Annual Business Meeting Friday morning. Please plan to attend.

President-Elect: **Sharon Patton**, Univ. of Tennessee, Knoxville
Donald J. Shure, Emory Univ.

Vice-President: **William C. Grant**, North Carolina State Univ.
Rebecca R. Sharitz, Savannah River Ecology Lab.

Secretary: **Sandra T. Bowden**, Agnes Scott College
J. Dan Pittillo, Western Carolina Univ.

Executive Committee: **James D. Caponetti**, Univ. of Tennessee, Knoxville
(Two positions) **Janice C. Coffey**, St. Mary's College
Hazel R. Delcourt, Univ. of Tennessee, Knoxville
David H. Rembert, Jr., Univ. of South Carolina

PRESIDENT-ELECT



Sharon Patton



Donald Shure

Sharon Patton—Associate Professor of Parasitology in the Department of Pathobiology at the University of Tennessee College of Veterinary Medicine. She received the B.S. degree in Biology from Middle Tennessee State University, the M.S. degree in Zoology, and the Ph.D. Degree in Parasitology from the Thomas Hunt Morgan School of Biological Sciences at the University of Kentucky. Before returning to Tennessee, she was a postdoctoral scholar with the Veterinary Science Department at the

University of Kentucky. Dr. Patton's research interests center around veterinary helminthology and protozoology. She has studied immune responses and epidemiology of host-parasite relationships as well as general life cycles. She is interested in zoonotic parasitic diseases and is presently involved in research concerning toxoplasmosis in dairy goats. At the University of Tennessee, Dr. Patton has served on a variety of committees and university organizations. At present, she is serving a second term on the Faculty Senate and is a member of the Research Council. She is immediate past chairperson of the Institute of Agriculture Advisory Council. In 1983, she received the Lindsay Young Outstanding Teacher Award and the University of Tennessee Woman of Achievement citation for the "Tradition of Excellence." In 1984, she received the "Outstanding Educator of the Year Award" from the Student Chapter of the AVMA. Dr. Patton has been an active member of ASB since 1973; she recently served on its Executive Committee and is presently Vice President of the Society. She is a member of several other scientific societies including the Southeastern Society of Parasitologists (President 1981-82), American Society of Parasitologists (representative to Council 1984-86), American Association of Veterinary Parasitologists, Sigma Xi, Tennessee Academy of Science, Helminthological Society of Washington, American Society of Tropical Medicine and Hygiene, Wildlife Disease Association, and AAAS.

Donald J. Shure—Dr. Shure is Associate Professor of Biology and formerly Director of Graduate Studies in the Biology Department at Emory University. He received the B.A. (1961) degree from Western Maryland College and M.S. (1966) and Ph.D. (1969) degrees from Rutgers University. Dr. Shure's research interests in ecology include plant-animal interactions, succession, and perturbation effects on ecosystem processes. His earlier work included studies of granite outcrops, Copperhill, Tennessee and floodplain forests at the Savannah River Plant. Current research involves changes in community structure and plant-herbivore interactions within forest openings of different size in the southern Appalachian Mountains. Dr. Shure has published numerous papers in the field of ecology and he has directed the research of 9 doctoral and 10 masters students. His professional activities included serving as the first Chairman of the Southeastern Chapter of the Ecological Society of America from 1976-78, during which he coordinated several activities with ASB and AIBS. He has also served on the Membership, Study, Buell Award, and Program Committees of the Ecological Society and was Chairman of the Study Committee, Program Chairman, and a member of the Council of The Ecological Society for 5 years. As Program Chairman, he organized the 1983 and 1984 annual ESA meetings with AIBS and edited the Program Issues of the ESA Bulletin. Dr. Shure is also on the Board of Trustees of the Highlands Biological Foundation and serves on the Board of Scientific Advisors and Board of Directors of the Highlands Biological Station. He has been a member of the Executive Committee of ASB (1980-81) and was Vice President in 1981-82.

VICE-PRESIDENT

William C. Grant—A native of Mullins, South Carolina, Dr. Grant is an Associate Professor in the Department of Zoology at North Carolina State University, Raleigh, North Carolina. Dr. Grant received the B.S. degree (1965) in Biology from Livingstone College, Salisbury, North Carolina, and the M.S. (1969) and Ph.D. (1972) degrees in Zoology from North Carolina State University. He was an Assistant Professor of Biology at State University of New York, College at Old Westbury during 1971-74. He has been on the faculty at North Carolina State University (NCSU) since 1974 and was elected to the NCSU Academy of Outstanding Teachers in 1981. He was a Visiting Scientist at the Dental Research Center, University of North Carolina at Chapel Hill, where he engaged in a research study leave during the Fall semester 1981. Dr. Grant's general research interest is the ultrastructure of parasitic helminths. His current research involves use of light and electron microscope histochemical methods to study hemic cells in inflammation. This work utilizes schistosome egg granuloma as a model for the study of hypersensitivity. Dr. Grant has served on the ASB Executive Committee since 1982 and is Chairman of the Endowment Study Committee. He is a charter member and the current Vice President of the Southeastern Society of Parasitologists and a member of the North Carolina Society for Electron Microscopy and Microbeam Analysis, Southeast Electron Microscope Society, Helminthological Society of Washington, and American Society of Parasitologists.

Rebecca R. Sharitz—Dr. Sharitz is Associate Ecologist at the Savannah River Ecology Laboratory and Adjunct Associate Professor of Botany at the University of Georgia. She received her B.S. from

Roanoke College and her Ph.D. from the University of North Carolina. Since joining the research faculty at SREL in 1972, she has published in the areas of plant population biology, thermal ecology, and effects of stress on wetland species and communities. She is also Head of the SREL Division of Wetlands Ecology. In 1975–76, she worked as a technical representative to the Energy Research and Development Administration and with the U.S. Secretariat of the Man and Biosphere Program. Dr. Sharitz has served on committees of the National Academy of Sciences, MAB, the National Science Foundation, and the Institute of Ecology. A member of several scientific societies, she has served the Ecological Society of America as an officer of the Southeastern Chapter (Vice-President 1976–78, President 1978–80), a Council member (3 terms), and a member and Chairman of the Board of Professional Certification, as well as a member of various other committees. She has been Secretary and Program Chairman of the Ecological Section of the Botanical Society of America and Newsletter Editor and Secretary/Treasurer of the International Society of Plant Population Biologists. A member of ASB since 1968, Dr. Sharitz has served as Secretary from 1982–85.

SECRETARY

Sandra T. Bowden—Botanist, Professor and Chair of the Department of Biology, Agnes Scott College, Decatur, GA. Dr. Bowden received her B.S. in biology from Georgia Southern College (1961) and her M.A. and Ph.D. in botany from the University of North Carolina at Chapel Hill. Her research interests are in developmental physiology, cytology, and morphogenesis of moss gametophytes; moss spore germination and protonemal development using light and electron microscopy and cytochemistry; and cytological, anatomical, and physiological studies of plant tumors induced by *Agrobacterium tumefaciens*. She taught for three years at Oglethorpe University, and has been at Agnes Scott since 1968. She received the Distinguished Biology Alumni Award from Georgia Southern College in 1976. Dr. Bowden has been an active member of ASB serving as a member of the Meritorious Teaching Award Committee (1982–1984) and Chair of that committee in 1983–1984. In addition to ASB, she is a member of the Botanical Society of America, AIBS, AAAS, Sigma Xi (Exec. Comm. member, Emory Chapter), Georgia Conservancy, and the Georgia Academy of Science (Chair for several paper sessions).

J. Dan Pittillo—A plant ecologist and Professor of Biology at Western Carolina University, Dr. Pittillo is a graduate of Berea College, University of Kentucky, and University of Georgia (1966). He teaches courses ranging from cellular biology to dendrology and natural history of the Southern Appalachians. His research interests involve vegetational studies in the Southern Appalachians and recently in Yunnan, China. In 1984 he completed an NSF-LTER project which documented various life stages of over 600 taxa at Coweeta Hydrologic Lab. He is currently investigating the vegetational history of the Southern Appalachians in cooperation with Paul and Hazel Delcourt of the University of Tennessee. This past spring he did comparative vegetational studies at Yunnan in southwest China as a part of the Western Carolina University professor exchange program. He is past Chairman of Priorities in Public Affairs Committee and a past member of the Place of Meeting Committee of ASB. He is Ecology Editor of *Castanea* and was President of the Southern Appalachian Botanical Club in 1977–78. He is Editor of the *Conservation Newsletter*, Highlands Biological Foundation. He is a member of Sigma Xi, Ecological Society of America, Botanical Society of America, and N.C. Academy of Science. He is a consultant to the N.C. Nature Conservancy and N.C. Natural Heritage Program.

EXECUTIVE COMMITTEE

James D. Caponetti—Professor of Botany at the University of Tennessee, Knoxville. He received the B.S. in Pharmacy and the M.S. in pharmacognosy (biology of medicinal plants) from the Massachusetts College of Pharmacy, Boston, and the A.M. and Ph.D. degrees in Biology (developmental plant morphology) from Harvard University. He has been at U.T.K. since 1961, where in addition to teaching undergraduate and graduate courses in his specialty, he has conducted research with publications in the developmental morphology of cinnamon, Appalachian vittraria, and Boston ferns. He is a member of 10 botanical and biological societies. He has served on several committees and held several offices, including President of the Tennessee Academy of Science, from 1966 to 1984, served as Secretary-Treasurer of the Pteridological Section of the Botanical Society of America from

1977 to 1983, and has been Treasurer of the American Fern Society since 1976. He has been a member of the Association of Southeastern Biologists since 1963, and has served on the Nominating Committee and the Faculty Awards Committee. He was Chairperson of the latter committee in 1983–1984.

Janice C. Coffey—Dr. Coffey received her B.S. in Science Education from Appalachian State University and M.S. and Ph.D. degrees in Biology from the University of South Carolina. She is currently Chairman of the Science Department at St. Mary's College, Raleigh, North Carolina. Her main interest is the teaching of botany, biology, and environmental science to undergraduate students. Her research interests in the systematics of the Juncaceae have led to field and herbarium studies in several parts of the world for work toward preparation of a monograph on this family. She has received grants from the National Science Foundation, the National Academy of Sciences, and the Fulbright Commission. A member of the ASB for nearly 20 years as student and teacher, she is also a member of the American Society of Plant Taxonomists, the International Association for Plant Taxonomy, the Botanical Society of America, AAAS, AIBS, Sigma Xi, Phi Beta Kappa, and the Southern Appalachian Botanical Club. She has served on the Council and as Secretary of the ASPT and as a member of various committees of the Botanical Society. She reviews Russian publications for the IAPT and has recently completed the first of a series of Russian bibliographic papers. A member of several conservation organizations, she is interested in the preservation of natural areas.

Hazel R. Delcourt—Research Assistant Professor of Botany and Ecology at the University of Tennessee, Knoxville. She holds a B.A. degree in biology from Albion College, a M.S. in botany from Louisiana State University, and a Ph.D. in Ecology from the University of Minnesota. Prior to joining the faculty at the University of Tennessee, she was a research associate in the Environmental Sciences Division, Oak Ridge National Laboratory. Primary research interests are pre-settlement vegetation and late-Quaternary vegetational history of the unglaciated southeastern United States, with a series of articles published in *Ecology*, *Ecological Monographs*, *Science*, *Quaternary Science Reviews*, *Quaternary Research*, *The American Midland Naturalist*, *Castanea*, and *Natural History*. She was co-recipient (with Paul A. Delcourt) of the 1974 ASB student research award. Within the ASB, she has served recently on the Student Travel Award Committee (Chairman in 1983) and is currently a member of the Award Committee for the Best Student Paper in Ecology presented at the ASB meetings.

David H. Rembert, Jr.—Professor of Biology at the University of South Carolina at Columbia. He is a native of Columbia having completed his undergraduate and masters degree at the University of South Carolina. He took his Ph.D. at the University of Kentucky at Lexington in 1967. He has taught at the University of Kentucky, at Converse College in Spartanburg, S.C., and, since 1967, at the University of South Carolina. In 1963 he joined the ASB and has been active at its annual meetings, giving numerous papers over the years in plant morphology, embryology, economic botany, and botanical history. He has served as editor of the *Bulletin of the South Carolina Academy of Sciences*, as secretary-treasurer of the Southeastern Section of the Botanical Society of America (meeting with ASB), and as vice-chairman and then chairman of the Historical Section of the Botanical Society of America. He has been chairman of the local chapter of the Society of the Sigma Xi and has served as a member of the nominating committee for the Southern Appalachian Botanical Club. In addition to above Societies, he is a member of the International Society of Plant Morphologists, the Society for the Bibliography of Natural History (British Museum, Natural History), member of the Governing Board of the Southern Garden History Society, and a Fellow of the Linnean Society of London.

Book Reviews

Meeuse, B. and S. Morris. 1984. **The Sex Life of Flowers.** Facts on File Publications, 460 Park Ave. South, New York, NY 10016. \$19.95. 152 pp., illus., hardback.

It is a delightful surprise when a book comes along that is truly superlative—beautifully written, magnificently illustrated with color photographs and line drawings, with an appropriate choice of topics and level of presentation, up-to-date with some of the most recent findings and interpretations plus a look into the future, as well as being beautifully designed, printed, and bound. This is such a book, based on the BBC and PBS Nature presentation “Sexual Encounters of the Floral Kind,” which was the result of nearly eight years of work. Bastiaan Meeuse is well known for his knowledge of and previous writings on pollination. Sean Morris is Director of Oxford Scientific Films, a leading organization in natural history photography. Together they have provided an account of sexual reproduction in plants, and more particularly floral biology and the fascinating array of pollinating mechanisms in flowering plants. The various pollination syndromes are described from both the point of view of the structural features and their adaptive significance in the life of the plant, as well as the characteristics and behavior of the animal pollinator. This is done, for a general audience as well as for the professional, with clarity, color, drama, and infectious enthusiasm plus an only slightly distracting and offensive infusion of teleology, anthropomorphism, and anthropocentrism. Topics include the evolution and advantages of plant sexuality, floral morphology and biology (various selfing and outcrossing mechanisms), a broad spectrum of biotic and abiotic pollination mechanisms (including those based on trickery, deceit, and mimicry), and the practical aspects of our knowledge of reproductive biology. In addition to the exquisite color photographs (many in full 8 × 11 inch size), there are a few explanatory line drawings, an appropriate glossary, and excellent selections of references (as recent as 1983) for further reading presented at the end of the book and without distracting text citations. This is a book that could and should be read by everyone and certainly by all biology students and biology teachers. It would be particularly beneficial for those interested in plant morphology, systematic botany, evolution, animal behavior, and plant breeding. This book should not just be on every biologist's bookshelf, but out on the living room table. (*Ed.*)

Thorpe, N. O. 1984. **Cell Biology.** John Wiley & Sons, 605 Third Avenue, New York, NY 10158. \$35.95. 718 pp., hardback.

The author's approach of studying cells from the external environment through the internal cellular organelles presents a logical and refreshing text for the students. It immediately helps the reader appreciate a wholeness of organisms and their cellular complexities rather than the usual fragmented and circuitous path of integrating physical and biological knowledge into a whole. The coverage that details the cell biology in higher plant eucaryotes is rather slim; however, the text covers some important structures and concepts. Overall, I find the text to be excellent for college seniors and new or young graduate students. (*J. P. Miksche, Botany Department, North Carolina State University.*)

Luoma, S. N. 1984. **Introduction to Environmental Issues.** Macmillan Publ. Co., New York, NY 10022. 548 pp., illus., hardback.

This is a book for beginning students in environmental science. Luoma differentiates between “the political philosophy of environmentalism” and “environmental science,” the objective “study of the structure and function of all environmental systems . . . [and] their interactions.” He addresses the latter, and, with only minor digressions, is successful in avoiding value judgements and the “shoulds” and “musts” that frequently mar books of this type. The book contains 20 issue-oriented chapters (plus an introduction and epilogue), discussing sequentially human population, ecosystem dynamics, wastes, food, nonrenewable resources, and energy. The discussions are generally thorough, timely, and well documented (more than 40 percent of the references come from *Science*, *Scientific American*, or

American Scientist). Chapter-end summaries and review questions are accurate and helpful. Discussions of the worldwide food situation (chapter 15) and the GNP-population-food dilemma of the LDCs (chapter 21 and Epilogue) are particularly illuminating. Unfortunately, the book suffers from weak editing (ambiguous and inaccurate writing, nonconformance between text and figures, unclear graphics, poor chapter organization, and factual errors), particularly in the sections on human population and ecosystem ecology. For example, p. 28 contains the statement, "When birth rates equal death rates and emigration equals immigration, population density becomes constant." While true, the statement describes a special case; in the more general situation, population density is stable when inputs equal outputs, when births plus immigration equal deaths plus emigration. Later (p. 58), the statement that "In 1957 . . . an average of 3.77 children were born by each woman in the United States" is obviously untrue. Several discussions of human population dynamics also fail to recognize mortality between birth and reproductive age. The text contains many figures based on a world map which has been excessively reduced in size, making much of the detail unclear. The general organization is shallow: each chapter is of equal weight (although they could have easily been grouped into four to six sections), each contains no more than three levels of subtitles, and ordination among subtitles is often confusing. Those who are bored by long discourses on laws, legal-institutional structures, and government programs and those who resent appeals to activism and the political process will find their absence refreshing. Those who are looking for material on endangered species and other wildlife issues; water resource development; forests (other than as a source of fuel); and park, recreation, and wilderness problems will be disappointed by their omission. Despite these weaknesses, Luoma has produced a valuable contribution to the library of environmental science, a well documented and thorough *Introduction to Environmental Issues* which stresses the most important areas—population, food, residuals, and energy. (David A. Adams, Forestry Department, North Carolina State University.)

Wootton, A. 1984. **Insects of the World.** Facts on File Publications, 460 Park Ave. South, New York, NY 10016. \$17.95. 224 pp., illus., hardback.

As one would expect, the title, *Insects of the World*, is a bit over-extended for the 224 pages of the book. The photographs, many in color, are the highlight of the book. The line drawings are reasonably accurate if representing specimens but the stylized drawings, oftentimes inaccurately or ambiguously labeled, often sacrifice the truth. In the "stylized representation of the external structure of a typical insect" (Fig. 1.1) the cercus is indicated as paired but the maxillae and mandibles are not. The labium is not illustrated as a united paired organ in Fig. 1.1 or Fig. 6.1. Two lines to two Malpighian tubules are labeled "Malpighian tubule." In Fig. 3.1, the edge of the Nearctic block is four times heavier than for the blocks representing the other geographical regions. The method of presentation lacks clarity, especially in areas containing islands. In Fig. 4.2, the pore canals are not labeled. In Fig. 6.1, the stipes is ambiguously labeled as the maxilla. The antennae were omitted from the illustration of the beetle head, Fig. 6.2(e). In short, these errors detract from the photographs. There are 16 chapters about insects, their origins, distribution, anatomy, senses, feeding parasitism, life histories, courtship, coloration, defenses, migration, and relation to man. (I do not find the British spellings distracting.) Two chapters are on social insects and aquatic insects and there is a chapter on nomenclature and taxonomy. There is a modest glossary, a two-page guide to further reading and an index. Taxonomy is defined in the glossary as the "scientific naming and classifying of animals and plants." Naming is nomenclature (not taxonomy) and taxonomy is not limited to organisms. The "Index" is limited to scientific and common names and does not include subjects such as elytra, mimicry, mouthparts, wings, and there is no cross-referencing in the text to the same or similar subject in the book. The superb colored and black and white photographs serve as a basis for relating many interesting facts about insects from many parts of the World. The book should appeal to the budding entomologist. Few of the species illustrated are from North America, therefore it would appear to have little use as a textbook for serious students or as a reference for professionals, here.

Clear reproduction of the fine colored photographs may still invite the attention of many. (Maurice H. Farrier, Entomology Department, North Carolina State University.)

Preston-Mafham, R. and K. Preston-Mafham. 1984. **Spiders of the World.** Facts on File Publications, 460 Park Ave. South, New York, NY 10016. \$17.95. 191 pp., illus., hardback.

The work contains the following chapters: Introduction to Spiders, Structure of Spiders, Classification of Spiders, Courtship and Mating, Life History of Spiders, Prey Capture, Spider Defence Mechanisms,

and Spiders and Man. Overall, it is written for the interested lay person or amateur biologist but the style is palatable to the professional biologist as well. The outstanding feature of this book is its abundance of illustrations (64 color photos, 32 black-and-white photos, and 29 line drawings). Considering that the publisher has produced "Sexual Encounters of the Floral Kind" for the "Nature" TV series, I was not surprised at the quality of the color photographs.

The authors cover the general biology of spiders and most scientific terms are adequately defined in the text or in the 2-page Glossary. Several well-executed line drawings serve to further define the terms used in the text. The chapter on "courtship and mating" is very entertaining as it details behavior of many common American and British species in a humorous anthropomorphic style. Under the heading "life history" the topics egg laying, egg-sac, development, parental care, moulting, regeneration, dispersal, and longevity are discussed. The basic methods of prey capture are outlined and common American and British examples are presented. The most well written section is that on spider defence mechanisms especially as regards the mygalomorph spiders which live in burrows constructed with bizarre defensive structures. Line drawings of some of these burrows enhance the accounts. The photographs in this chapter depicting examples of species with cryptic coloration and mimics are a highlight of the book.

Included in the book are an Appendix listing the spider families of the world, a Guide to Further Reading containing a list of 6 authoritative and famous recent works, and an Index. For the price, I recommend it as a good value considering the photographs alone. (*Michael K. Hennessey, Entomology Department, North Carolina State University.*)

Anderson, S. and J. K. Jones, Jr. (Eds.). 1984. Orders and Families of Recent Mammals of the World. John Wiley and Sons, New York, NY. \$54.95. xi + 686 pp., hardcover.

This book provides a systematic synopsis of "selected semi-technical material" for the 21 recent orders and 131 families of mammals through 19 independently authored chapters. A brief introduction by the editors describes the characters of mammals that, while factual, is not particularly readable. The second chapter summarizes the origins and evolution of mammals and provides a fossil history of each order. This paleontological history is concise and presents a good background for the chapters that follow but requires a strong working knowledge of geologic time and mammalian terminology. The remaining 17 chapters are devoted to accounts of the orders and families. Each of these includes sections entitled Diagnosis, Recent Distribution, Geologic Range, and Remarks. The accounts of orders conclude with a list of families. Accounts for families contain more detailed information on General Characters, Habits, Habitat, Recent Genera, and Major Fossil Groups and maps illustrate the distribution of each family. The major features of each order, and sometimes of families (rodents), are conveniently illustrated on a single page.

The editors recognize the fact that the use of multiple authors has resulted in unequal treatment of groups. For example, the 300+ species of Vespertilionid bats are discussed in three and a half pages of text, less than that provided for 14 species of caviés and guinea pigs (Family Caviidae).

Maps and illustrations are a compact source of information. Unfortunately the 105 figures are at the same time one of the few disappointments of this book. Illustrations are inconsistent in technique and quality, often varying within the same figure (Figures 52, 53, and others), sometimes making comparisons difficult. Base maps used throughout the book are visually cluttered yet lack political boundaries that would aid in orientation. Individual variation in stippling of the maps (hand vs. commercially available press-on stippling) contributes further to the visual inconsistencies. Most of the figures are full page and thus dominate a fair percentage of the text making the entire book generally unattractive.

In spite of these minor shortcomings the book is a useful and needed reference. It contains an excellent selection of approximately 2000 references and is more up-to-date than the recently reworked Walker's *Mammals of the World* (4th edition), the only other single source that provides an authoritative, systematic treatment of the world's mammals. (*Mary Kay Clark, N.C. State Museum of Natural History, Raleigh, NC.*)

Zomlefer, W.B. 1983. **Common Florida Angiosperm Families, Part 1.** Published privately by the author, Florida State Museum, Natural Sciences Department, University of Florida, Gainesville, FL 32611. \$8.15. 107 pages, 42 figures, softback.

An illustrated guide to families of flowering plants of any region of the United States might be considered an asset to students of taxonomy, but a guide to families in Florida is particularly significant since there are no recent manuals or guides that treat families of the entire state. It is also rewarding to see a master's thesis published in book form. This work includes treatments of 34 families (9 Liliidae and 25 Annonidae) arranged according to the system of Thorne. Each treatment consists of a plate depicting one or more native or naturalized taxa chosen to represent the diversity and diagnostic features of a family, and a discussion. The discussion includes a brief description; a characterization of the family in Florida; number of taxa; distribution; important economic plants and products; notes on pollinators, taxonomic problems, and other miscellany; and selected references. The descriptions are generally carefully done and the format is consistent, the illustrations are adequate, accurate, and mostly instructive although the legends are not always as complete as they might be. The artistic style is imitative of that in G. H. M. Lawrence's *Taxonomy of Vascular Plants* and *Hortus Third* of Bailey and Bailey. Representatives of most of Thorne's superorders are included. Students will find the information helpful when they can find it. The phylogenetic arrangement of the families in the text and the lack of an index will be a constant burden to those who would otherwise find the work most helpful. A useful glossary is provided but not all technical terms employed in the descriptions are included and some of the definitions are quite brief. Despite these problems, beginning students and others interested in studying the Florida flora will find this work of value and well worth the price. (J. Massey, *Herbarium, University of North Carolina at Chapel Hill*.)

Ziesler, G. and A. Hofer. 1984. **Safari.** Facts on File Publications. 460 Park Ave. South, New York, NY 10016. \$24.95. 197 pp., 141 photographs, 6 maps, hardback.

This book describes the authors' experiences during a year spent observing wildlife in Kenya. Ziesler's photographs depict events related in Hofer's diary entries, which serve as text. Photographs are not accompanied by captions, but are referenced to the appropriate text by numerals (much like references in *Science*). Because the photographs and text are carefully juxtapositioned, it is easy to move between the two (unlike using references in *Science*); in fact, I found the presentation improved over conventional formats due to the absence of intruding captions. The book is relatively free of other interruptions such as typographical errors, also, and generally is pleasant reading. I am not qualified to review the book as a contribution to the art of photography. As a naturalist I can only say that it contains many wonderful photographs of wildlife and wild places, some of which are surely works of art. A sequence of a python swallowing a gazelle, a perched lilac-breasted roller, and a mud-encrusted African buffalo are a few of the many photographic highlights. On another level the photographs should render the book competitive in the coffee-table market. My mission, however, is to review the book as a natural history volume, and I therefore concentrate on what is depicted and how it is described in the text. This can best be described as glimpses of the daily lives of African vertebrates and the places they live. Hofer is an excellent observer, and her descriptions are as vivid and detailed as Ziesler's photographs, so much so that many readers will see more through her eyes than they would witnessing the events themselves (e.g., description of the feeding of yellow-billed storks, p. 128). However, the book is not a good introduction to African wildlife because an overview of a species' lifestyle exists only in the accumulation of the disjointed observations of it presented. The only organization is chronological, and only a few species are portrayed frequently enough to form any kind of overview. Indeed, a prior knowledge of natural history is often assumed in the presentation. The book therefore will be most appreciated by those already somewhat familiar with the places and species described. For that audience it provides an enjoyable and insightful vicarious safari. It will especially appeal to those fond of predation, as over a third of the book is devoted to lions, cheetahs, and hyenas, with special emphasis on their hunting. Most visitors to Africa spend all their time watching a handful of species, and miss most of the African wildlife experience. The authors are somewhat guilty of the same obsession, but fortunately not entirely: to me, the best sections of the book were those devoted to unpopular but fascinating species such as hornbills, jackals, and wildebeest. Readers should be forewarned that Hofer's interpretations of events are not of the same quality as her descriptions. The

former are often anthropomorphic and otherwise open to question. There are also a few erroneous facts, such as identifying what is really a white-headed vulture as a hooded vulture on p. 93, and blaming elephants for the demise of Amboseli's trees when a changing water table is actually the culprit (p. 42). Rather than use the book as a source of facts, concentrate on what is described, the vivid glimpses of places and animals that both text and photographs provide. One can not understand the Mara ecosystem or wildebeest life cycle from reading this volume, but one can form a lasting impression of what it is like when a herd of migrating wildebeest attempt to cross a river. (*Jeffrey R. Walters, Zoology Department, North Carolina State University.*)

News of Biology in the Southeast

Jon R. Fortman—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

Auburn University, Department of Botany, Plant Pathology, and Microbiology. *D. M. Bisaro* gave the feature address "Genetic Engineering of Plants" at the annual fall meeting of Auburn University Chapter of Sigma Xi, *R. T. Gudauskas* is serving as President of the local chapter. *Gareth Morgan-Jones* was awarded the degree of Doctor of Sciences by his alma mater, the University of Wales, for his contributions to mycology, at a congregation of the University of Cardiff, Wales. *P. A. Lemke* was appointed to a 5-year term as editor of *Applied Microbiology and Technology*.

Georgia

Agnes Scott College, Department of Biology. Two new faculty are *Dr. Lawrence J. Davenport* and *Dr. Edward L. Hover*. Dr. Davenport is a botanist with a Ph.D. from The University of Alabama, and will be teaching botany, ecology, plant taxonomy and serving as coordinator of laboratories. Dr. Hover is a zoologist with a Ph.D. from The University of Michigan, and will be teaching anatomy, physiology, and histology.

Kentucky

Western Kentucky University, Department of Biology. *Dr. Joe E. Winstead*, Professor of Biology, became the 70th President of the Kentucky Academy of Science at the annual November meeting.

Louisiana

University of Southwestern Louisiana, Department of Biology. *Dr. Robert Jaeger* is organizing a symposium on Salamander Behavioral Ecology to be held in Norfolk, Virginia, during the summer of 1986. For more information, please contact Dr. Jaeger. *Dr. Carl Mohrherr* has accepted a one year position in the department. He was previously at the Univeristy of Eduardo Mondlane in Maputo, Mozambique. *Dr. Roy Brown* and *Dr. Betty Lemmon* participated in the International Symposium on Sexual Reproduction in Seed Plants, Ferns, and Mosses, held recently in the Netherlands.

Louisiana State University, Baton Rouge, Department of Botany. New greenhouse facilities are under construction and will provide the department with much needed space for research and teaching materials. The department has begun the search for qualified faculty to fill new tenure-track positions in Plant Ecology, Systematics, and Cell Biology-Physiology. *Dr. Sharon Mathews* has joined the department as a Research Associate. She will assist faculty and staff in management and use of the electron microscopy facilities, and in the further development of ultrastructural research in the plant sciences. The department will host the annual Spring meeting of the American Society of Plant Physiologists-Southern Section in February 1985, and will host the national meeting of the American Society of Plant Physiologists in June of 1986.

Mississippi

Mississippi State University, Department of Biological Sciences. *Dr. Franklin R. Champlin* has been appointed Assistant Professor. His specialty is bacterial physiology. *Dr. Stephen B. Pruett* has

joined the faculty with interests in cellular immunology, regulation of immune systems, and microbial genetics. *Dr. Frank Pezold*, Assistant Professor, has been appointed to the faculty. His research interests are in systematics, evolution, and ecology of marine and freshwater fishes. Five pre-doctoral research fellowships, covering a 12-month period with a stipend of \$10,000, have been established. Fellowships will be awarded on a competitive basis on or about July 1, 1985. Students interested in applying to the graduate program and for these fellowships should submit transcripts, three letters of recommendation, GRE scores, and a statement of career goals to *Dr. Barbara H. Turner*, Graduate Coordinator, Department of Biological Sciences, P.O. Drawer GY, Mississippi State, MS 39762. Deadline for application is April 15.

Gulf Coast Research Laboratory, Ocean Springs. Seventeen field-oriented marine science courses are in the 1985 summer offerings. They include Oceanography I & II, Marine Science for Teachers I & II, Marine Botany, Salt Marsh Plant Ecology, Marine Microbiology, Parasites of Marine Animals, Coastal Marine Geology, Marine Invertebrate Zoology, Marine Vertebrate Zoology, Behavior and Neurobiology of Marine Animals, Carcinology, Aquaculture Special Topics and Problems, and Comparative Histology of Marine Organisms. For more information, write Registrar, G.C.R.L., Ocean Springs, MS 39564. A research grant to develop a workable plan for siting artificial reefs in federal waters of the Gulf of Mexico has been awarded to the Mississippi-Alabama Sea Grant Consortium. Also, a federal grant just approved will provide Sea Grant funds for more than 80 faculty researchers, support personnel, and graduate and undergraduate students involved in 14 marine-related projects at universities and research institutions in Mississippi and Alabama.

North Carolina

University of North Carolina at Wilmington, Department of Biological Sciences. *Dr. Ronald K. Sizemore* received funds to study "Mortality in Soft Shell Shedding Operations." *Dr. James F. Parnell* received a grant to study "Colonial Waterbird Populations in Cape Hatteras National Seashore." Funds from the N.C. Sea Grant Program will enable *Dr. David G. Lindquist* to study "The Feasibility and Value of Artificial Fish Aggregation Devices." *Dr. Paul E. Hosier* received funds to study "The Effects of Off-Road Vehicles on Barrier Island Communities."

North Carolina State University, Department of Botany. *Dr. Jerome P. Miksche*, Professor and Head of Botany for the past seven years, has accepted a National Program staff position with the USDA, ARS. His new address is: USDA, ARS National Program Staff, BARC West, Building 005, Rm. 229, Beltsville, Maryland 20705.

North Carolina State University, Horticultural Science. *Dr. Kathy Williams* (Ph.D., Cornell University) has joined the faculty as Assistant Professor with extension responsibilities in tree fruits. *Dr. August A. deHertogh* has completed a six month study leave with the International Flower Bulb Center, Hillegom, Netherlands. *Dr. L. George Wilson* was an invited participant in Barbados for the "Appropriate Postharvest Technology and Strategies for Perishable Caribbean Crops." *Dr. Mary Peet* presented an invited paper entitled "Source/Sink Factors Affecting Cultivar Response of Carbon Dioxide Enrichment" at the International Symposium in Oslo, Norway. *Dr. Katherine Perry* was appointed as a United States representative to the World Meteorological Organization's Commission for Agricultural Meteorology. *Dr. J. C. Raulston* has been awarded the L. M. Ware Distinguished Teaching Award for recognition of outstanding contributions to the horticultural profession and industry, particularly as a teacher, advisor, and motivator of undergraduates. *Dr. A. R. Bonanno* received the Homer C. Thompson award for recognition of outstanding research as a graduate student in vegetable crops, and *Ann Herriott* was awarded the Outstanding Graduate Student Award for her paper entitled "The Heritability of Resistance to Early Blight Disease in Diploid Potatoes." *John M. Shribbs* was awarded second place at the 37th Annual Meeting of the Southern Weed Science Society for his paper entitled "Response of Apple Seedlings to Several Soil Management Systems." *Dr. Charles M. Mainland*, *Dr. Walter Skroch*, and *Dr. Joseph Brooks* were elected to membership in Gamma Sigma Delta. *Dr. Wanda Collins* was elected Historian of the NCSU chapter. *Doug Doohan* was awarded second place for his paper entitled "Residue and Efficacy of Fluzifop-butyl in Strawberries."

Wake Forest University, Department of Biology. *Dr. Ronald V. Dimock* (Ph.D., U. of Calif., Santa Barbara) has been named Chairman of the Biology Department. He replaces *Dr. Gerald W. Esch*, who was appointed Dean of the Graduate School. *Dr. Dimock* has been with the university since 1970.

South Carolina

University of South Carolina, Department of Biology. Botanists from throughout South Carolina are currently working to update the known distribution of vascular plants in the state. To date, 11,000 records have been added to the existing 30,000 records in Radford, Ahles and Bell's 1965 Atlas of the Flora of the Carolinas, including 382 taxa new to the state. Any institutions or individuals who wish to contribute, please contact Cynthia Aulbach-Smith, Department of Biology, University of South Carolina, Columbia, SC 29208 or Douglas A. Rayner, S.C. Wildlife and Marine Resources Department, P.O. Box 167, Columbia, SC 29202.

Virginia

University of Richmond, Department of Biology. *Dr. R. Dean Decker* spent three weeks in South Africa in conjunction with a Botanical Delegation sponsored by the People-to-People Ambassador Program. *Dr. W. John Hayden* received a grant from NSF for a project entitled "RUI: Instrumentation for Research in Systematic Anatomy of Euphorbiaceae." *Dr. David W. Towle* has been awarded an NSF grant for research with "The Crustacean Gill as a Model Sodium-Transporting Epithelium: Isolated Membrane Vesicle."

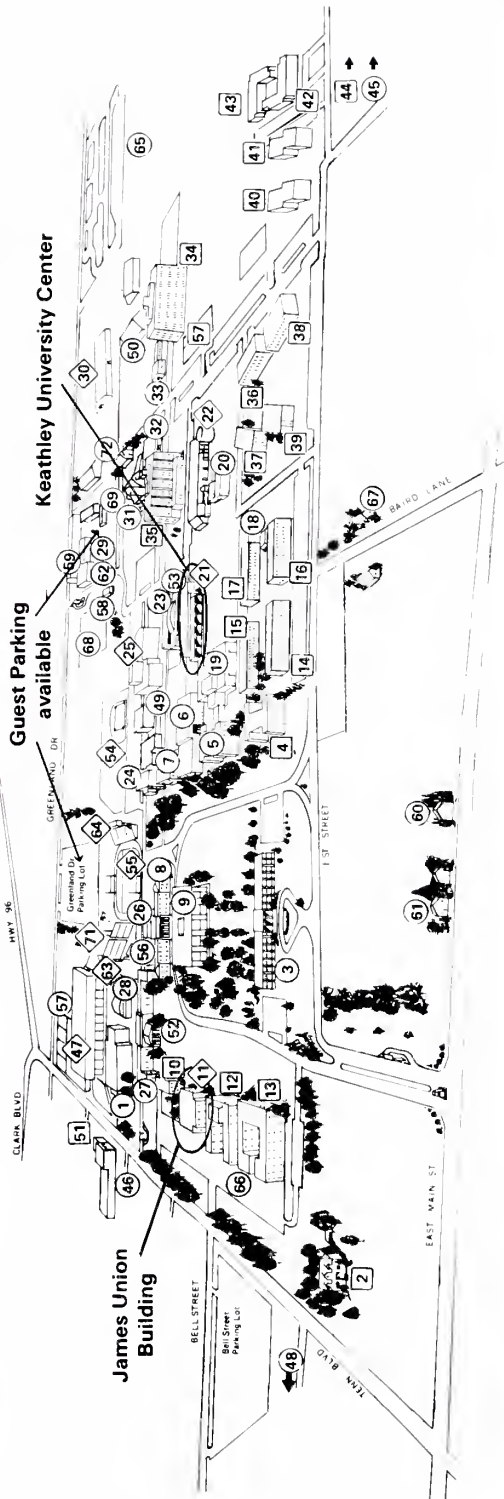
ABOUT MUSEUMS AND BOTANICAL GARDENS

Kentucky

Museum of History and Science, Louisville. The Museum is offering a wide range of activities, educational and entertaining, for children of all ages during the holidays. From ages 4-9, "Visions of Sugarplums," "Elf-Shelf," "Kid's Holiday Workshop," "Christmas Customs Near and Far." For children 9 or older, the museum will offer "Spaceport Louisville," "Epworth Handbell Choir," and the "Yellow Submarine." For those over 21, "Dickens on Main Street" begins the holiday season in 1984.

The Kentucky Museum, Bowling Green. The Museum's annual spring quilt exhibit will feature 10 quilts from the museum collection. The Henry Clay "portrait" quilt purchased in New York will be included. The quilt exhibits will be on display from April 2, 1985, through May 27. Beginning April 15, a traveling exhibit of Shaker artifacts called "Inner Light," will be on display through June 1, 1985.

Middle Tennessee State University



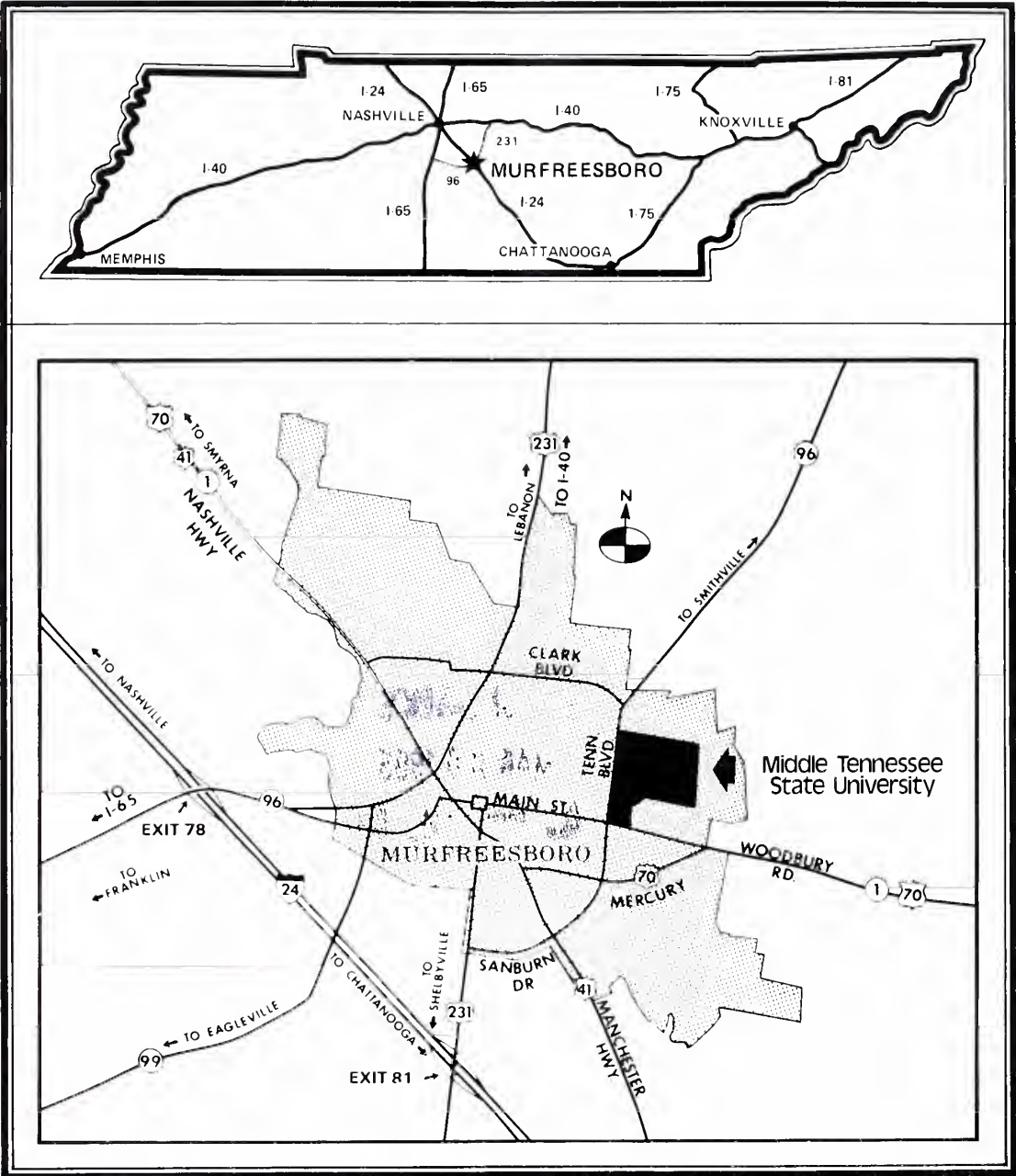
LEGEND

- | | | | |
|---|--|--------------------------------------|---|
| 1 Alumni Memorial Gym (A M G) | 19 Davis Science Building (D S B) | 37 Wood Hall | 55 Horace Jones Field |
| 2 Cooper's Home | 20 Graphic Arts (G A) | 38 Gore Hall | 56 Business Building (BUS) |
| 3 Cope Administration Building (C A B) | 21 Keathley University Center (K U C) | 39 Clement Hall | 57 Tennis Courts |
| 4 Smith Hall | 22 Learning Resources Center (L R C) | 40 H Dorm | 58 Chilling Plant |
| 5 Wiser-Patten Science Hall (W P S) | 23 Forrest Hall (F H) | 41 I Dorm | 59 Maintenance Complex |
| 6 Todd Library (LIB) | 24 Saunders Fine Arts (S F A) | 42 J Dorm | 60 Criminal Justice Center / Diagnostic Center (H C) |
| 7 Jones Hall (J H) | 25 Boutwell Dramatic Arts (B D A) | 43 K Dorm | 61 Haynes House (Recording Studio) (H H) |
| 8 Kirksey Old Main (K O M) | 26 Heating Plant | 44 Family Student Apartments | 62 Public Safety and Security |
| 9 Peck Hall (P H) | 27 Industrial Arts (I A) | 45 Child Development Center (D C C) | 63 Blue Raider Room |
| 10 Rutledge Hall | 28 Pool | 46 Ellington Home Economics (E H E) | 64 President's Box |
| 11 James Union Building (J U B) | 29 Maintenance Office Building | 47 Murphy Athletic Center (M C) | 65 Highway Safety Instructional Facility |
| 12 Lyon, Mary, McHenry Hall | 30 Livestock Pavilion (L PAV) | 48 Campus School (CM SH) | 66 Wansley House (TVA Solar) |
| 13 Monohan, Reynolds, Scharadt Hall | 31 Art Barn (A B) | 49 Wright Music Building (W M B) | 67 rental space |
| 14 Sims Hall | 32 Stark Agriculture Center (S AG) | 50 Vocational Agriculture (V A) | 68 MTSU Band Marching Area |
| 15 Beasley Hall | 33 McFarland Health Services | 51 Home Living Center (H L C) | 69 Art Barn Annex |
| 16 Judd Hall | 34 Cummings Hall | 52 Drawing Building | 70 Greenhouse |
| 17 Gracy Hall | 35 High Rise Dorm & Cafeteria | 53 ROTC Annex (R O T X) | 71 Picnic Pavilion |
| 18 Woodmore Cafeteria | 36 Felder Hall | 54 Smith Baseball Field | 72 Old Horse Barn |

○ Academic and Support □ Residential ◇ Public Assembly



Highway map to
Murfreesboro and MTSU



59.06

The ASB

BULLETIN

Volume 32, Number 3

July 1985



Nanorchestes sp.—a Tennessee mite

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The Association of Southeastern Biologists*

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Volume 32, Number 3 - July 1985

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COVER

SEM (1061 $\times$) of the mite *Nanorchestes*, collected from a cedar glade in Rutherford Co., TN. It is possibly a new species and a new state record. *Courtesy of Steve Murphy, Unionville, TN.*

TIME AND PLACE OF FUTURE MEETINGS

1986 April 9-12	University of South Carolina, Columbia
1987	University of Georgia, Athens (50th Anniversary)

PATRON MEMBERS

Carolina Biological Supply Company, Burlington, NC
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Hybridization in Eastern North American *Rhus* (Anacardiaceae)¹

James W. Hardin and Lyle L. Phillips

Department of Botany and Department of Crop Science
North Carolina State University
Raleigh, NC 27695

Abstract

Barriers to natural hybridization among the eastern sumacs are spatial and temporal. Otherwise, hybrids and introgressants are fairly common and experimental crosses, made among four species, yield 1–50% viable seeds. Naturally occurring hybrids are *R. copallina* × *R. lanceolata*; *R. glabra* × *R. michauxii* (*R. × ashei*); and, *R. glabra* × *R. typhina* (*R. × borealis*). The experimental hybrid *R. michauxii* × *typhina*, between allopatric species, gave the highest percent (50%) viable seeds and showed considerable heterosis in growth rate. Trichomes of the pericarp, observed using SEM, are of five types: capitate gland, bulbous gland, clavate, acicular, and fusiform. Each species and hybrid has a characteristic trichome complement of taxonomic significance. The fusiform trichome is considered to be a hybrid derivative, intermediate between the clavate and acicular types and found only in interspecific hybrids. Both hybridizations and fruit trichomes give evidence of interspecific relationships, but a cladistic study will have to await additional data.

Key words: *Rhus*, sumac, hybrids, trichomes, SEM

INTRODUCTION

The sumacs, *Rhus* subg. *Rhus* (subg. *Sumac* T & G), include about ten species primarily of warm-temperate North America and Eurasia. There are five species and two named interspecific hybrids in North America (Barkley 1937; Brizicky 1962; Little 1979).

Three of the North American species (*R. copallina* L., *R. glabra* L., and *R. typhina* L.) are wide-ranging and are sympatric over large areas. The other two are much more restricted in their distribution. *Rhus lanceolata* (Gray) Britt. occurs from southern Oklahoma and east Texas to southern New Mexico and north-eastern Mexico and is sympatric with *R. copallina* and *R. glabra* in the eastern portion of its range. *Rhus michauxii* Sarg. is a very local and rare “endangered endemic” (Sutter *et al.* 1983) of the Piedmont, formerly from North Carolina to Georgia but now known only from central North Carolina. It is apparently on the verge of extinction since only one of the 15 widely separated populations contains both male and female plants. It is sympatric with both *R. copallina* and *R. glabra*.

In view of the extensive sympatry of the species, and their ability to cross and form fertile hybrids, questions arose concerning the extent of hybridization and the recognition of hybrids and introgressants. The purpose of this paper, therefore, is to discuss our observations of natural hybrids, experimentally produced hybrids (made by Phillips), and the trichomes of fruits using scanning electron microscopy (studied by Hardin).

¹ Paper No. 9886 of the Journal Series of the North Carolina Agricultural Research Service, Raleigh, N.C. 27695-7601.

Table 1. Trichome complements on the fruits of *Rhus* species and hybrids.

	Capitate gland	Bulbous gland	Clavate	Fusiform	Acicular
Glabra	+		+		
Michauxii	+		+		
Typhina		+			+
Copallina		+			+
Gla. × Typh.	+	+	+	+	+
Mich. × Typh.		+	+	+	+
Gla. × Mich.	+		+	+	

MATERIALS AND METHODS

The techniques used for SEM studies follow the procedure used for leaves (Hardin and Phillips 1985). Materials were collected (by both of us) from throughout eastern United States and southern Ontario, and (by Phillips) from western United States. Experimental crosses (by Phillips) were made by pollinations using entire inflorescences. Percent viable seed was determined by floatation; *i.e.*, percent seeds which sank in water (viable) of total number of seeds (drupes).

FRUIT TRICHOMES

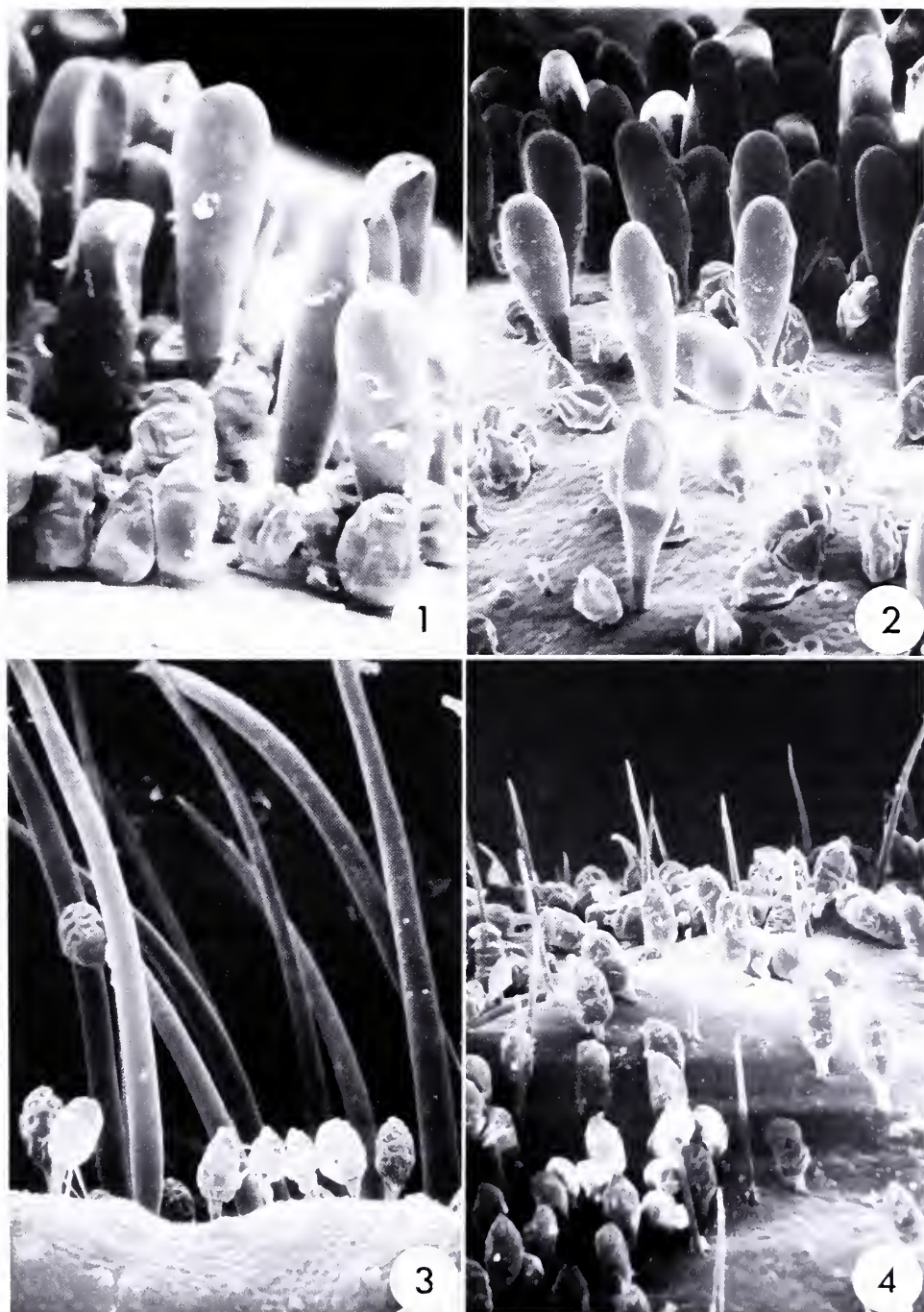
In addition to characteristics such as stem and petiole vestiture, rachis wings, leaflet serrations, and leaflet shape and size, two of the very conspicuous and useful features for the identification of the species and hybrids are the fruit vestiture and trichome types described by Barkley (1937, 1938), Brizicky (1962, 1963), and Gleason (1952). Brizicky (1963) stated that "... the morphology of hairs may apparently be of considerable taxonomic importance ... for distinguishing the species but also as a criterion of interspecific relationships and an evidence for natural hybridity." SEM was used to provide a more exact characterization of the trichomes, *in situ*, with the hope also of finding other micromorphological features of the fruit surface that were not observed by light microscopy. Five different trichomes are described from the surface of the fruits. Their distribution among the five species and hybrids are shown in Table 1.

1. **capitate gland**—small, stipitate gland with a unicellular stalk and unicellular or bicellular, globose head; entire gland 50–75 μm long (Figs. 1, 2). These occur in *R. glabra* and *R. michauxii* and hybrids with *R. glabra*. These are found on the leaves of *R. glabra* and *R. michauxii*, however Hardin and Phillips (1985) did not distinguish them at that time from the bulbous type. They appear to be a distinct type, at least on the fruit, rather than merely a developmental stage.

2. **bulbous gland**—larger, stipitate gland with a unicellular stalk and a multicellular, oblong-ovoid or cylindrical head; entire gland 85–120 μm long (Figs. 3, 4, 6–8). This type occurs in *R. copallina* and *R. typhina* and hybrids with *R. typhina*. This is similar to those on the leaves of *R. copallina* and *R. typhina* (Hardin and Phillips 1985).

3. **clavate**—multicellular-uniseriate, broadest at the rounded apex; 130–300 μm long (Figs. 1, 2, 5–8). These were called "obovoid hairs" by Barkley (1938). They occur in *R. glabra* and *R. michauxii* and hybrids with either of these.

4. **acicular**—multicellular-uniseriate, long and tapered from the base to the



Figs. 1-4. Trichomes on sumac fruits. 1. *R. glabra*, $\times 200$. 2. *R. michauxii*, $\times 120$. 3. *R. typhina*, $\times 120$. 4. *R. copallina*, $\times 120$.

sharp-pointed apex; 0.5–3 mm long (Figs. 3, 4, 6–8). These are found in *R. copallina* and *R. typhina* and hybrids of *R. typhina*.

5. **fusiform**—multicellular-uniseriate, broadest at or below the middle and tapering to both ends, rounded or blunt-pointed at the apex; 180–1000 μm long

(Figs. 5–8). These are found only in the hybrids and are considered to be a hybrid form between the clavate and acicular types. They were called “cigar-shaped” and described by Barkley (1938) as an intermediate form from the *R. glabra* × *typhina* hybrid. Although hybrid hairs are apparently unusual, they have been described in *Parthenium* by Rollins (1944) and *Quercus* by Thomson and Mohlenbrock (1979). Most interspecific hybrids merely combine parental trichome types rather than have a unique intermediate form.

The barriers to natural hybridization among the sumacs studied here are spatial and temporal. Otherwise, hybridization and introgression are fairly common. Four of the five species have been experimentally crossed in all combinations (by Phillips) in the greenhouse or field (Genetics Garden, NCSU). These crosses are discussed individually.

Rhus copallina* × *R. lanceolata

Although *R. lanceolata* was not included in this study, Barkley (1937) mentioned its possible hybridization with *R. copallina*. Gray’s original description, as *R. copallina* var. *lanceolata*, may indicate the lack of a clear discontinuity between the two. They should be studied in the regions of sympatry in Oklahoma and Texas.

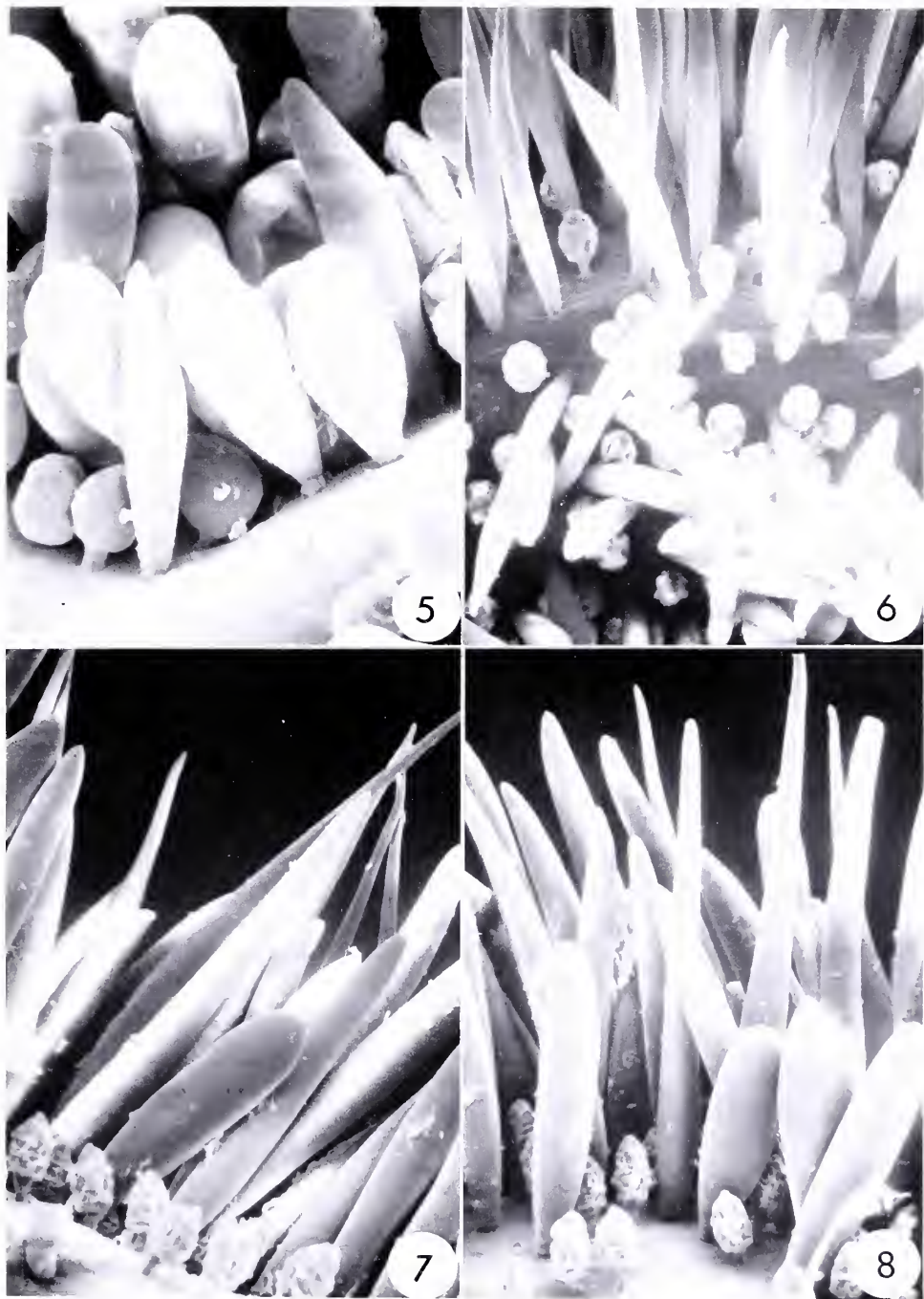
Rhus copallina* × *R. glabra

Rhus copallina has been hybridized experimentally only with *R. glabra* and this at a very low success rate—viable seeds/total seeds of less than 1%. The reason for this is unknown. Although *R. copallina* is sympatric with *R. glabra*, *R. michauxii*, and *R. typhina* in various parts of eastern United States, it is effectively isolated by differences in flowering times. *Rhus copallina* flowers in late summer whereas *R. typhina*, *R. glabra*, and *R. michauxii* flower in early, mid, and late spring, respectively. Thus there are no natural hybrids between *R. copallina* and these others. Experimental crosses were possible since all the species of *Rhus* flowered together under greenhouse conditions. No fruits of *R. copallina* × *R. glabra* were examined. Leaf surfaces of the hybrid have intermediate characters as described by Hardin and Phillips (1985).

Rhus glabra* × *R. michauxii

Experimental crosses gave a 20% success rate for viable seeds. In the natural sympatric populations in east-central North Carolina, the flowering time of *R. glabra* overlaps that of *R. michauxii* for approximately the late and early one-third of the flowering periods, respectively.

The intermediate between *R. glabra* and *R. michauxii* was named first in 1895 by W. W. Ashe (as *R. caroliniana*, non Mill.). It was renamed *Schmaltzia ashei* Small in 1903 and *R. ashei* (Small) Greene in 1906. Ashe (1927) considered it a hybrid, “×*Schmaltzia ashei*,” based on his observations of seedlings, some of which were the same as *R. glabra*, and others the same as *R. michauxii*. None of the type specimens has been located or identified with certainty (at NCU), but two rather dissimilar Ashe collections from the type locality (middle North Carolina) appear to be of hybrid origin, in that these combine characters of the two parents. Two additional specimens (at NCU) from other collection sites, each identified as *R. michauxii*, also appear to be the hybrid *R. × ashei*.



Figs. 5-8. Trichomes of fruits of sumac hybrids. 5. *R. glabra* $\times$ *R. michauxii*, $\times 200$. 6. *R. glabra* $\times$ *R. typhina*, $\times 120$. 7. *R. michauxii* $\times$ *R. typhina*, $\times 120$. 8. *R. michauxii* $\times$ *R. typhina*, $\times 100$.

A systematic search of *R. michauxii* populations in the Carolinas and Georgia (by Phillips) showed that *R. $\times$ ashei* is present in the eastern Piedmont of North Carolina in seven of nine areas where the parental species are sympatric, and two locations where *R. michauxii* has been reported but cannot now be found. Several

of these hybrid populations occur over rather extensive areas. Since mixed populations are predominantly *R. glabra*, the introgressants grade toward *R. glabra*. Hybridization obviously is limited by the rarity of *R. michauxii*.

The fruit of *R. glabra* × *R. michauxii* (Table 1) has the capitate glands and the clavate trichomes of the parental species as normally expected, plus the fusiform type (Fig. 5). The presence of this fusiform trichome, supposedly intermediate between the clavate and acicular, is an enigma in this hybrid since neither of the parental species have acicular trichomes and there is no evidence of any genetic influence from *R. typhina* in the eastern Piedmont of North Carolina. Foliar surfaces of *R. ×ashei* are intermediate in vestiture, but have the ridged abaxial cuticle of *R. michauxii* and the epicuticular wax of *R. glabra* (Hardin and Phillips 1985).

Rhus glabra* × *R. typhina

Experimental crosses gave a 25% success rate for viable seeds. In the natural populations, *R. glabra* and *R. typhina* overlap in their flowering times, with *R. typhina* beginning a few weeks earlier in the spring than *R. glabra* in southern latitudes and lower elevations. Since male clones flower earlier than female, the short overlap period would provide an opportunity for most of the natural F₁ crosses to be from *R. glabra* pollen on *R. typhina* stigmas.

Of all the natural sumac hybrids, this is the most common, based upon herbarium records, field studies, and the literature. Hybrids are found most frequently in the southern Appalachians and northward into the Great Lakes area (northern Indiana and southeastern Michigan), southern Ontario, and the Finger Lakes region of New York. Flowering periods of these two species appear to be compressed and therefore overlap considerably in both the higher altitudes and latitudes. In Michigan, they both flower in June (Barnes and Wagner 1981) but with a noticeable variation among clones (Gilbert 1961) that may be attributable to introgression. Some of the hybrid swarms or introgressant populations cover several acres in which it is difficult to find clones that do not combine one or more of the distinguishing characteristics and phenology (?) of the two parental species. Introgression is reciprocal in most areas. A large hybrid population distributed over several square miles in southern Ontario is especially interesting in that neither typical *R. glabra* nor *R. typhina* could be found in or near the population.

Several published names have been applied to the *R. glabra* × *R. typhina* hybrid derivatives: *Rhus glabra* var. *borealis* Britt.—1901 (*R. borealis* (Britt.) Greene—1906), *R. sandbergii* Greene—1906, *R. ×pulvinata* Greene—1908, and *R. ×hybrida* Rehd.—1913. According to the key and descriptions by Barkley (1937), *R. ×pulvinata* originally was applied to a hybrid closer to *R. typhina*, while *R. borealis* and *R. sandbergii* were applied to those more like *R. glabra*. If a collective epithet is desired, *R. ×borealis* has priority over the others.

The fruit trichomes are of all five types (Table 1, Fig. 6), including the capitate and clavate of *R. glabra*, bulbous and acicular of *R. typhina*, plus the hybrid fusiform type. It was in this hybrid that Barkley (1938) first recognized the “cigar-shaped” or fusiform type. Foliar trichomes are similar for the parental species and the hybrids (Hardin and Phillips 1985).

Rhus michauxii × *R. typhina*

Experimental crosses gave a 50% success rate for viable seeds, and the offspring showed a considerable amount of heterosis in growth rate as compared with that of the parental species. The two species are allopatric which precludes natural hybridization.

The fruits (Table 1, Figs. 7, 8) have bulbous glands and acicular trichomes of *R. typhina*, clavate trichomes of *R. michauxii*, plus the hybrid fusiform type. It is interesting that this trichome complement apparently lacks the capitate gland of the *R. michauxii* parent. The leaf surfaces have intermediate vestiture, somewhat ridged abaxial cuticle (like *R. michauxii*), and epicuticular wax (of *R. typhina*).

Rhus michauxii has been considered most similar to the European *R. coriaria* L. (Barkley 1937). However, attempts to cross *R. coriaria* with representatives of the four North American species in this study have been successful only with *R. glabra*.

INTERSPECIFIC RELATIONSHIPS

Based upon rather superficial comparisons of general habit, winged rachises, and pubescence, one would envision two phenetic groupings, one with *R. copallina/lanceolata/michauxii*, and the other with *R. glabra/typhina*. However, Barkley (1937) stated that *R. michauxii* was closest to *R. javanica* L. of Asia and *R. coriaria* L. of Europe than to any American species.

On the basis of features such as foliar glands (Hardin and Phillips 1985), red non-glandular trichomes of the fruit, and red or orange pericarp (Brizicky 1963) and experimental and natural hybridization (discussed here), the close relationships would appear to be between *R. glabra/michauxii/typhina* in one group and *R. copallina/lanceolata* in the other. Yet, similar petiolar anatomy is shared by *R. copallina*, *R. glabra*, and *R. typhina* (Brizicky 1963), and fruit trichomes alone (Table 1) would group *R. glabra/michauxii* vs. *R. copallina/typhina*.

A clearer picture of interspecific relationships will have to await additional evidence from anatomy, palynology, chemistry, embryology, cytology, etc. A thorough study of these taxa of sumacs, and those of the related *Lobadium* and *Toxicodendron*, with a careful cladistic approach, is very much needed.

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Association Affairs

1985 MERITORIOUS TEACHING AWARD



Dr. Margaret Y. Menzel

The winner of the 1985 ASB Meritorious Teaching Award was Dr. Margaret Y. Menzel, Professor of Biology, Florida State University, Tallahassee, Florida. The award, sponsored by Carolina Biological Supply Co., consists of a citation, a certificate, and \$1000.00. Professor Menzel will also receive a bound volume of the original letters of support from students, friends, and colleagues.

Dr. Menzel began her career as Instructor of Chemistry and Bacteriology at Lamar College in Beaumont, Texas, after graduating with honors from Southwestern College. She spent several years as Instructor in Agronomy at Texas Agricultural Experiment Station, moving into genetics research intermittently at Florida State University while employed by the U.S. Department of Agriculture. She became affiliated, fulltime, with FSU in 1963, attaining the rank of Professor in 1968. She has served as Associate Chairman for Graduate Affairs (1972-73) and has served on many University committees.

Dr. Menzel has been an active member of the ASB for many years, having served as secretary, 1963–66; Vice-President, 1967–68; and on the Travel Award Committee, 1969–70. She was Editor of the *ASB Bulletin* from 1972–77. In 1977 and 1981 she organized symposia on chromosome structure and function.

An avid researcher, Dr. Menzel has produced many publications and maintains memberships in too many professional societies to mention here. She is internationally known as a lecturer, investigator, and presenter of invited papers. Dr. Menzel is also active in human affairs at the local, state, national, and international levels.

Her former students used phrases such as “demanded (and got) excellence”; “opened her home to us”; “teaches with enthusiasm for learning”; and “is the essence of professionalism.” Clearly, Dr. Margaret Y. Menzel has served as a role model as well as a meritorious teacher.

1985 RESEARCH AWARDS

The **ASB Research Award** to faculty members was presented to *Dr. J. Dan Pittillo*, Western Carolina University, and *Dr. Hazel R. Delcourt*, University of Tennessee, Knoxville. Their award-winning paper was “*Comparison of contemporary vegetation and pollen assemblages on an altitudinal transect in the Balsam Mountains, western North Carolina*,” the abstract of which is presented below.

Interpretation of late-Quaternary vegetational history from sediment deposits of wetlands or lakes is facilitated by comparing existing vegetation with pollen deposition beneath it. Collections of paired vegetation plots (10 × 10 m) with included pollen samples (from moss polsters) were made at 92.5 m elevational intervals between 610 and 1860 m elevation along the Blue Ridge Parkway southwest of Asheville, N.C. The vegetation was grouped into six types: 1) flood plain forest, 2) mesic oak forest, 3) xeric oak forest, 4) cove forest, 5) yellow-birch boulderfields, and 6) spruce-fir forest. Pollen assemblages were found to accurately reflect the vegetation cover type. *Quercus*, *Betula*, *Fagus*, *Abies*, and *Picea* showed good correlation of percent pollen and percent cover. Certain pollen types were found restricted with local deposition (*Halesia*), some were extra-local and a little wider distributed (*Abies*), some were regional and distributed up to 10 km from their origin (*Pinus*), and some were transported from outside the region (*Liquidambar*).

The **Student Research Award**, sponsored by Martin Microscope Company of Easley, SC, was presented to *Phillip E. Ryals*, a graduate student at the University of Alabama. The paper was entitled “*Enhancement of macrostome formation in a low-transforming subline of Tetrahymena vorax by alpha-tocopheryl succinate and other compounds*.” The abstract is below.

The effect of alpha-tocopheryl succinate, phylloquinone, coenzyme Q₉, various antioxidants, several alcohols, and ferric iron on microstome to macrostome transformation in a low-transforming subline of *Tetrahymena vorax* was investigated under non-heat shock and heat shock conditions. None of the compounds tested induced morphological conversion when used under non-heat shock conditions. However, when cells of the microstomal form were first subjected to heat shocks and then washed into certain test solutions, a significant increase in the percentage of macrostomal cells produced was observed. Alpha-tocopheryl succinate (10⁻⁴ M), phylloquinone (10⁻⁴ M), coenzyme Q₉ (10⁻⁴ M), 0.095% 1-pentanol, and ferric iron (15 ppm) were the most effective enhancers of heat shock-induced macrostome production. The alcohols 1-propanol (0.95%), 1-butanol (0.095%), and 2-pentanol (0.095%) also increased the yield of macrostomal cells formed following heat shock, but to a lesser

degree. Although alpha-tocopheryl succinate is known to possess antioxidant properties, other antioxidants tested produced no significant enhancement of macrostomal cell formation. This suggests that the enhancing function is carried out by means of some other mechanism.

The **Eugene P. Odum Award**, sponsored by the Southeastern Chapter of the Ecological Society of America, was presented to *Marina C. Jovanovich*, University of Alabama at Birmingham. The paper, by Marina Jovanovich and Ken R. Marion, was “*Effects of body lipids, carbohydrates, and temperature on uptake and depuration of anthracene by the clam, Rangia cuneata, in Mobile Bay, Alabama.*” The abstract is reprinted here.

It has been suggested in the literature that seasonal variations in the accumulation and release of polycyclic aromatic hydrocarbons in bivalves exist. In this study, the clam *Rangia cuneata*, was dosed every 6 weeks for a one-year period with 200 ppb (9-¹⁴C) anthracene at 10, 20, and 30°C. Uptake of (9-¹⁴C) anthracene was determined in clams over a 15-hour period, and depuration was also measured over a period of 2 weeks. These data were statistically analyzed and correlated to the annual cycles of body lipids and carbohydrates. *Rangia* was found to accumulate approximately 20 times the concentration of anthracene in water. Results indicate that uptake and depuration of anthracene increases with temperature. The nutritional status or stage of the reproductive cycle also influences the pattern of accumulation and release of anthracene. (Research sponsored by Mississippi-Alabama Sea Grant No. NA81A-D-0050.)

1985 COMMERCIAL EXHIBITORS

Bellwether Press, Edina, MN
Carolina Biological Supply Co., Burlington, NC (**Patron Member**)
Department of Anatomy, Univ. of Tennessee, Memphis, TN
Forestry Suppliers, Inc., Jackson, MS
Martin Microscope Co., Easley, SC (**Patron Member**)
Parco Scientific Co., Vienna, OH
Preiser Scientific, Inc., Louisville, KY
Southern Biological Supply Co., McKenzie, TN
Southern Micro Instr., Atlanta, GA
Southwestern Scientific, Tucson, AZ
Vashaw Scientific, Norcross, GA
Wadsworth Publishers, Belmont, CA
Wm. C. Brown Publishers, Dubuque, IA
Worth Publishers, New York, NY

EMERITUS MEMBERS

A member of the ASB for ten or more years and who has retired from professional duties is eligible for election to Emeritus Membership with exemption from annual dues. Those wishing such designation should make this request to the Treasurer. The following members were elected at the Murfreesboro meeting:

Horton H. Hobbs, Jr., Falls Church, VA
Jesse S. White, Cleveland, MS

NECROLOGY

During the past year, the ASB lost the following members by death:

Earl L. Core, West Virginia Univ. (ASB Meritorious Teacher 1971)

Victor A. Greulich, Univ. of North Carolina, Chapel Hill (ASB Editor 1954–58, Vice-President 1958–59, President 1960–61)

Donald B. Jeffreys, East Carolina Univ.

Robert Kuehne, Univ. of Kentucky

Septima C. Smith, Fort Worth, TX

Lucille Walton, Danville, VA and Mountain Lake Biological Station

THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

TREASURER'S REPORT

1 January 1984 - 31 December 1984

I. SAVINGS ACCOUNT

A. Merrill-Lynch Ready Assets Trust	
Balance January 1, 1984	\$10,526.93
Net Transfers to/from Checking	(1,696.01)
Interest Earned 1984	<u>646.00</u>
Balance December 31, 1984	9,476.92

II. CHECKING ACCOUNT

Balance on Hand, January 1, 1984		431.75	
A. Receipts			
Regular Dues/Subscriptions	10,856.16		
Annual Meeting, Memphis, TN	734.38		
Honorarium Reimbursement (Botanical Society of America)	250.00		
Bulletin Page Charges	450.00		
Interest	<u>\$ 38.76</u>		
TOTAL RECEIPTS			\$12,329.30
TOTAL RECEIPTS AND BEGINNING BALANCE			\$12,761.05
B. Disbursements			
1. Membership Cultivation			
Printing & Mailing, Call for Dues	\$243.45		
Printing & Mailing, Call for Papers	704.54		
Brochure folders	<u>193.42</u>		
			\$ 1,141.41
2. Publication			
ASB Bulletin (Vol. 31), Printing	9,061.21		
Roll Maintenance for Bulletin Mailing	<u>200.98</u>		
			9,262.19
3. Office Expenses			
Treasurer	6.06		
Other Officers	<u>22.34</u>		
			28.40
4. Travel and Related Expenses			
Student Travel Awards	1,499.78		
April Speaker Honorarium	500.00		
April Speaker Travel	<u>673.85</u>		
			2,673.63
5. Research Awards			
			<u>1,000.00</u>
TOTAL			14,105.63
NET TRANSFERS TO/FROM SAVINGS			(1,696.01)
TOTAL DISBURSEMENTS			<u>12,409.62</u>
BALANCE IN CHECKING December 31, 1984			351.43
SUMMARY			
CASH IN CHECKING			351.43
CASH IN SAVINGS			9,476.92
TOTAL ASSETS			<u>9,828.35</u>

CONSTITUTION AND BY-LAWS OF THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

(approved April 12, 1985)

ARTICLE I. Name

The organization shall be known as the Association of Southeastern Biologists.

ARTICLE II. Objectives

The objectives of the Association shall be to encourage in the broadest and most liberal manner the advancement of Biology as a science by the promotion of research in Biology; by the increase and diffusion of knowledge of Biology; by emphasis on the relation of fundamental knowledge of biology to the solution of biological problems; by the preservation of biological resources; and by meetings, reports, discussions, and publications to promote scientific interests and inquiry, thereby adding to the health, happiness, and knowledge of all peoples.

ARTICLE III. Eligibility and Affiliation

Section 1. Members, in general, shall be residents of the Southeastern States and shall be known as (A) Active Members or (B) Emeritus Members. Business or institution members include (C) Business Affiliates, (D) Patron Members, and (E) Library Members.

Section 2. Any person is eligible for active membership in the Association who is engaged in (A) biological research, (B) the teaching of biological subjects, (C) graduate study in the biological sciences, or (D) work in the various fields of applied biology. Active members include regular members, student members, contributing members, and sustaining members.

Section 3. Any member may be elected as Emeritus Member who has been a member of the Association for ten (10) or more consecutive years and who has retired from professional duties. An Emeritus Member shall have the same rights and privileges as an Active Member.

Section 4. Any organization contributing one hundred (100) dollars or more per annum to the support of the Association shall be known as a Business Affiliate. Any individual or organization contributing three hundred (300) dollars or more per annum to the support of the Association shall be known as a Patron. Patron members who sponsor an ASB award will pay the amount of the award and receive the Patron Membership status free from the Association. Business Affiliates and Patrons will receive the publications and notices of the Association and may send representatives to the annual meetings but shall not have the right to vote.

Section 5. Any organized group which is interested in biology may become an affiliate of the Association of Southeastern Biologists upon recommendation of the Executive Committee and approval of the Association at its annual business meeting. The purpose of affiliation is to promote communication and cooperation among the societies involved, but such affiliation does not confer the privilege of individual membership in the Association of Southeastern Biologists upon members of affiliated societies. The terms of affiliation shall be arranged between the Executive Committee of the Association of Southeastern Biologists and each affiliate society.

ARTICLE IV. Officers

The officers of the Association shall be (A) President, (B) President-Elect, (C) Vice President, (D) Secretary, and (E) Treasurer.

ARTICLE V. Annual Meeting

Section 1. The annual meeting of the Association shall be held in April at such place as may be recommended by the Executive Committee and approved by the membership at an annual business meeting. The date of the meeting shall be determined by the Executive Committee.

Section 2. In case of an emergency, the Executive Committee may change the time and place of the annual meeting or may call a special meeting.

ARTICLE VI. Quorum

Fifty (50) members of the Association shall constitute a quorum for the transaction of business.

ARTICLE VII. Disposition of Property

In the event of the dissolution or termination of the Association, title to and possession of all the property of the Association shall pass forthwith to the American Association for the Advancement of Science, Washington, D.C.

ARTICLE VIII. Incorporation

The Executive Committee, with the approval of the membership in a vote at an annual business meeting, may apply for incorporation of the Association as a non-profit scientific and educational organization without capital stock under the laws of any of the southeastern states within its area.

ARTICLE IX. Amendments

Section 1. This Constitution may be amended at any annual business meeting by a three-fourths majority of those present, provided due notice of said amendment has been sent by the Secretary to each member at least thirty (30) days in advance of the meeting, provided the amendment has been proposed by the Executive Committee or by a committee authorized by the Association at a previous annual meeting, and provided that so long as the Association shall be or remain an organization exempt under Section 501 (c) (3) of the Internal Revenue Code of 1954, as amended, no amendment shall be made to Article II or Article VII of this Constitution without consent having been obtained from the Internal Revenue Service.

Section 2. Amendments to this Constitution shall become effective at the close of the annual meeting at which they are adopted.

BY-LAWS

ARTICLE I. Membership

Section 1. Membership shall be granted any eligible person upon receipt of a written application and dues payment for the current year. The application shall include the signature of one active member in good standing, certifying eligibility.

ARTICLE II. Election of Officers

Section 1. (A) Annually the nominating committee shall prepare a multiple slate of nominees for each office or vacancy to be filled. Members are privileged to recommend to the nominating committee persons for any or all offices.

(B) The slate of the nominating committee shall be presented to the membership on or before Thursday evening of the Annual Meeting, and the election shall be held at the following business session when nominations will be called for from the floor.

(C) The Secretary shall prepare ballots for distribution. These ballots shall be distributed and collected by three tellers appointed by the President. A majority vote will constitute election to office. Where more than one person is to be elected to a position (e.g., members of the Executive Committee), the two or more receiving the highest number of votes shall be declared elected.

(D) The results of the election shall be announced as soon as possible after the tellers have counted the ballots, and the successful candidates shall be presented to the membership. All ballots shall be deposited with the Secretary who shall retain them for one year.

Section 2. (A) A President-Elect shall be elected annually and shall become President at the close of the next annual meeting following election.

(B) A Vice President shall be elected annually. Neither the President nor the Vice President shall be immediately eligible for re-election.

Section 3. (A) A Secretary and (B) a Treasurer shall be elected for a term of three (3) years each, and they shall be eligible for immediate re-election to additional terms. The Secretary and Treasurer shall not be elected to office in the same year except to fill an unexpired term.

Section 4. Should an office other than that of President or that of President-Elect become vacant during the year, the Executive Committee shall appoint a member to fill that office until the next election.

Section 5. Newly elected officers shall assume the duties of their offices at the close of the annual meeting in which they were elected except the Treasurer who shall assume duties on 1 January of the following year.

ARTICLE III. Duties of Officers

Section 1. The President shall be the directing officer of the Association, shall perform the duties usual to that office, and shall appoint, with the advice of the Executive Committee, regular committees, special committees authorized by the Executive Committee, and a representative to the American Association for the Advancement of Science (AAAS). Also, the President shall appoint such other special committees as may be required and shall notify Emeritus members of their election.

Section 2. The President-Elect shall be responsible for organizing the program for the general session of the annual meeting, and shall be responsible for promoting membership in the Association. In the event of the resignation, death, or incapacity of the President-Elect during his or her term of office, the Executive Committee shall declare the person who received the next highest number of votes for the office to be President-Elect. If this individual is unable to accept, the Executive Committee shall nominate two members for the office, to be voted upon by the membership by mail ballots.

Section 3. The Vice President shall be the public relations officer of the Association. In the absence of the President from any meeting the Vice President shall discharge the duties of the office. In the event of the death or resignation of the President, the Vice President shall become President of the Association.

Section 4. The Secretary shall keep records of the meetings of the Association and of the Executive Committee, conduct the routine business of the Association

pertaining to the office, attend to the preparation and distribution of ballots at elections, and report the activities of this office to the Association at the annual meeting. The Secretary of the Association shall be Ex-Officio Associate Editor of The ASB Bulletin. In addition the Secretary shall be authorized to sign appropriate papers in case the Treasurer is incapacitated.

Section 5. The Treasurer shall receive and disburse all funds of the Association, keep the necessary records of dues and funds expended and maintain a roster of the membership. He or she shall at all times coordinate the efforts of this office with those of the offices of the Secretary and of the Editor, and shall report annually all receipts and expenditures to the membership. The Treasurer is authorized to reimburse the Secretary for expenses incurred in attending the annual meeting of the Association and interim meetings of the Executive Committee. The Executive Committee may by special action also authorize the Treasurer to reimburse other officers of the Association for all or a portion of expenses incurred in attending interim meetings of the Executive Committee, not to exceed one per year. The Treasurer of the Association shall be Ex-Officio Business Manager of The ASB Bulletin.

ARTICLE IV. Dues and Fees

Section 1. The annual dues of the Association shall be set by the membership following recommendation by the Executive Committee.

Section 2. The fiscal year of the Association shall be from January 1 to December 31.

Section 3. Any member in arrears in the payment of dues in excess of one (1) year at the close of the Annual Meeting shall be dropped from the membership roster by 1 June of that year.

Section 4. Delinquent members who desire reinstatement to membership shall pay a reinstatement fee of one year's dues in addition to the regular dues for the current fiscal year. If the membership has lapsed over five (5) years, the individual must reapply as a new member.

ARTICLE V. The ASB Bulletin

Section 1. The ASB Bulletin shall be the official publication of the Association, and shall be published quarterly or at such other regular intervals as may be determined by a vote of the membership upon recommendation by the Executive Committee.

Section 2. The Editor of The ASB Bulletin shall be a member of the Association, responsible for the editing and publication of the Bulletin, and shall be selected and appointed by the Executive Committee for a term of three years. The Editor shall be eligible for reappointment for any number of successive three-year terms. Upon the recommendation of the Editor, the Executive Committee may appoint a Circulation Manager for the Bulletin.

Section 3. The ASB Bulletin shall be supplied to all members of the Association without charge beyond the stated annual dues. Organizations may subscribe to The ASB Bulletin at a rate equal to the annual dues for contributing members, but such subscriptions will not carry the privileges of membership in the Association. The Executive Committee, upon the recommendation of the Editor, may establish special prices for back issues or volumes of the Bulletin.

Section 4. Any major change in editorial policy proposed by the Editor shall be subject to the approval of the Editorial Board.

ARTICLE VI. Executive Committee

Section 1. (A) The Executive Committee shall be in charge of the affairs of the Association between the Annual Meetings. (B) This Committee shall be composed of the officers of the Association, the immediate Past President, and six (6) members elected from the membership.

Section 2. The six elected members of the Executive Committee shall serve for terms of three (3) years, two members being elected each year. These members are eligible for re-election to the Executive Committee. Should a vacancy occur among these six members, the Executive Committee shall appoint a member to serve until the next election.

Section 3. The Executive Committee shall select and appoint an archivist who shall be custodian of the permanent records or archives and shall, with the approval of the Executive Committee, make such arrangements as may seem appropriate for the collection, care, and maintenance of such records. The archivist shall serve for a term of three years and shall be eligible for reappointment for any number of successive 3-year terms.

Section 4. The Editor of The ASB Bulletin and the Archivist shall be Ex-Officio Members of the Executive Committee with the power of discussion and the privilege of proposing motions but shall not have the right to vote.

Section 5. The Executive Committee shall serve as an Ex-Officio Editorial Board for the Bulletin and shall be responsible for determining the major editorial policies of the Bulletin in consultation with the Editor.

Section 6. A majority of the Executive Committee shall constitute a quorum, provided all members have been notified of the proposed meeting.

ARTICLE VII. Regular Committees

Section 1. The following regular committees shall be appointed by the President upon the approval of the Executive Committee:

- A. Auditing Committee
- B. Nominating Committee
- C. Faculty Research Awards Committee
- D. Student Research Awards Committee
- E. Meritorious Teaching Award Committee
- F. Travel Award Committee
- G. Place of Meeting Committee
- H. Local Arrangements and Program Committee
- I. Resolutions Committee
- J. Conservation Committee

Section 2. The duties of the regular committees shall be as follows:

A. The Auditing Committee shall examine the records of the Treasurer prior to the annual business meeting of the Association and shall report the condition of the accounts to the membership at this meeting.

B. The Nominating Committee shall, with due consideration of suggestions received from the membership, prepare a multiple slate of nominees for each office or vacancy to be filled.

C and D. The Research Awards Committees shall each year select recipients of the Association Research Prizes.

E. The Meritorious Teaching Award Committee shall each year select a member of the Association to receive an award for meritorious teaching.

F. The Travel Award Committee shall make monetary awards to assist graduate students to attend the annual ASB meetings.

G. The Place of Meeting Committee shall recommend to the Executive Committee the place where the annual meeting shall be held.

H. The Local Arrangements and Program Committee shall make arrangements for the annual meeting including receipt and scheduling of scientific papers to be presented.

I. The Resolutions Committee shall formulate and present to the Association through the Executive Committee such resolutions as may be considered worthy of action by the Association.

J. The Conservation Committee shall accumulate facts with reference to environmental problems, shall disseminate such information to the membership at its (the Committee's) discretion, and shall bring new resolutions concerning matters of significance to the attention of the Executive Committee, through the Resolutions Committee, for presentation to the membership.

Section 3. The Executive Committee may from time to time establish special ad hoc committees as needed. The members of all such committees shall be appointed by the President.

ARTICLE VIII. Papers

Section 1. All titles of papers and abstracts submitted for the program shall be in the hands of the Program Committee by the date set by the Editor and announced in the Call for Papers.

Section 2. Each title submitted shall be accompanied by two (2) copies of an abstract following the guidelines in the Call for Papers.

Section 3. Except by special action of the Program Committee the maximum time allowed for the presentation of a paper shall be ten (10) minutes. The presiding officer will enforce this rule.

Section 4. Papers presented before the Association at the annual meeting shall be read only by members or by persons introduced by members.

ARTICLE IX. Amendments

Section 1. These By-Laws may be amended at any annual business meeting of the Association by a two-thirds majority vote of those present.

Section 2. Amendments to these By-Laws shall take effect at the close of the meeting at which they were adopted.

A VIEW FROM HERE

An expression of gratitude and sincere appreciation should first be made to the immediate Past President, Charles O'Kelley, for the outstanding service he has rendered our Association over a period of several years. His name became practically synonymous with ASB during the many years that he served as treasurer of the organization. In this position he provided sound and effective leadership in the management of the Association's financial affairs. The recent annual meeting of ASB at Middle Tennessee State University in Murfreesboro, Tennessee, held under his leadership as president, further attested to the outstanding service that Charles O'Kelley has rendered to the Association.

The impact of the successful annual meeting in Murfreesboro still resounds in the ears of all those fortunate enough to be in attendance. The activities at these meetings were indeed consonant with the associated objectives of the Association, which in essence are to play a leading role in fostering research endeavors among biologists of the southeastern United States, and to serve as a principal source of information on the needs, problems, and biological resources of the region. At the meetings the well attended special symposium on "Plant Genetic Engineering," organized by Michael Torres and sponsored by the Southeastern Section of the Botanical Society of America; the deeply informative and stimulating featured address by Patricia Walne on "Euglenoid Flagellates: Model Systems for Experimentation"; the symposium on "Biota, Ecology, and Ecological History of Cedar Glades," organized by Paul Somers and co-sponsored by the Southeastern Chapter of the Ecological Society of America and ASB; and the symposium on Rare Plant Species organized by Robert Sutter and sponsored by the ASB Conservation Committee admirably complemented the regular paper sessions in the realization of Association goals. However, to further enhance the visibility of the ASB as the leading organization of biologists of the Southeast additional attention needs to be focused on several areas. Included among these areas are membership expansion and participation, enhancing the significance of the Bulletin as a reference resource, and increasing the diversification of discipline representation at the annual meetings. These are not new areas of emphasis. They are all areas that have been previously addressed by all past presidents and past Executive Committees.

On the matters of membership expansion and membership participation, the following suggestions may be helpful. ASB members in a department might make copies of the general program of the recent annual meeting and distribute these copies, along with the ASB information brochure and application form, to their colleagues and graduate students. Also, ASB members who are involved in the state academies of science might circulate the same items of information to colleagues in the biological sciences division of the academy. Increased member participation is needed in the following ASB activities: (1) Submission of papers for the Faculty Research Award and the Student Research Award. Both awards, sponsored by the Association and Martin Instrument, serve to recognize outstanding research contributions by faculty colleagues and students in the Southeast. Members are encouraged to enter research papers in competition for these significant awards. (2) Nominations for the Meritorious Teaching Award. This is the Association's most prestigious award. The Award Committee encourages new nominations and the resubmission of previous unselected nominations for this

award. (3) Submission of papers for presentation at the annual meetings. All members are encouraged to not only attend annual meetings but to present papers on their research. In order to accommodate substantial increases in research paper submissions, the Executive Committee has decided to include poster sessions in the 1986 meetings. An announcement on this inclusion will appear in the Call-for-Papers and in issues of the Bulletin.

There have been previous calls for the submission of research manuscripts for publication in the Bulletin. I should like to repeat this call. The ASB Bulletin should become an important information resource on biological research pertinent to the Southeast. Its value as a reference resource might also be enhanced by publishing expanded abstracts or short summaries of selected articles, of interest to the Southeast, that have appeared in other journals. This practice might facilitate a wider circulation of articles of this nature in the Southeast. In addition, a practice might be adopted to publish past presidents' addresses or featured addresses of annual meetings.

The Association needs to continue to strive towards increasing the subdisciplines of biology that are represented by the sections of papers or posters presented at the annual meetings. The areas of cell, developmental, and molecular biology are key subdisciplines in which expanded representation is needed.

There is an opportunity also for the Association to play a key role in the development and implementation of the National Biological Survey Project that is now under serious consideration. After all, the originator and foremost advocate of this project is a biologist from the southeast, Dr. Michael Kosztarab of the Department of Entomology at Virginia Polytechnic Institute and State University. Impetus is growing for the initiation of a national biological survey. The interests and expertise of a large number of ASB members place the organization in a strategic leadership position for such an endeavor in the Southeast.

Next year we look forward to a return to the University of South Carolina for the annual meetings. With your help, the officers, Executive Committee, and the Local Arrangements Committee shall endeavor to make this meeting another memorable and rewarding scientific and social occasion.

—Lafayette Frederick, President

ASB OFFICERS, COMMITTEES, AND REPRESENTATIVES: 1985–1986

President—Lafayette Frederick, Botany, Howard University, Washington, DC 20059 (202/636-6929).

President-Elect—Donald J. Shure, Biology, Emory University, Atlanta, GA 30322 (404/329-4209).

Vice-President—Rebecca R. Sharitz, Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29801 (803/450-6211).

Retiring President—J. Charles O'Kelley, Biology, The University of Alabama, University, AL 35486 (202/348-5960).

Secretary—Sandra T. Bowden, Biology, Agnes Scott College, Decatur, GA 33030 (404/373-2571).

Treasurer—Robert L. Beckman (1986), Botany, North Carolina State University, Raleigh, NC 27695-7612 (919/737-3341).

Executive Committee Members-at-Large —

Carol C. Baskin (1987), School of Biological Sciences, The University of Kentucky, Lexington, KY 40506 (606/257-8770).

Janice C. Coffey (1988), Science, St. Mary's College, Raleigh, NC 27611 (919/828-2521).

Courtney T. Hackney (1987), Biology, University of North Carolina at Wilmington, NC 28403 (919/791-4330).

W. H. Martin (1986), Natural Areas, Eastern Kentucky University, Richmond, KY 40475 (606/622-1476).

David H. Rembert (1988), Biology, University of South Carolina, Columbia, SC 29208 (803/777-3837).

Joe E. Winstead (1986), Biology, Western Kentucky University, Bowling Green, KY 42101 (502/745-3696).

Auditing Committee—*Chairperson*: Grover C. Miller, Zoology, North Carolina State University, Raleigh, NC 27695-7617 (919/737-2588); Janice C. Coffey, Science, St. Mary's College, Raleigh, NC 27611 (919/828-2521); Jon M. Stucky, Botany, North Carolina State University, Raleigh, NC 27695-7612 (919/737-2227).

Conservation Committee—*Chairperson*: JoAnn White (1986), Biology, University of North Carolina, Chapel Hill, NC 27515 (919/962-2144); Hal R. DeSelm (1987), Botany, University of Tennessee, Knoxville, TN 37915 (615/974-6208); J. Marcus Safley (1988), Soil Conservation Service, P.O. Box 2890, Washington, DC 20013 (202/447-3921).

Local Arrangements Committee for 1986—*Co-chairpersons*: John Herr, Biology, University of South Carolina, Columbia, SC 29208 (803/777-8110; David Rembert, Biology, University of South Carolina, Columbia, SC 29208 (803/777-3837); *Program Co-chairpersons*: Wallace Dawson, Department of Biology, University of South Carolina, Columbia, SC 29208 (803/777-3107); David Lincoln, Biology, University of South Carolina, Columbia, SC 29208 (803/777-7306).

Meritorious Teaching Award Committee—*Chairperson*: Robert B. Short (1986), Biology, Florida State University, Tallahassee, FL 32306 (904/644-3700); Temd R. Deason (1987), Biology, The University of Alabama, University, AL 35486 (205/348-5960); Charles Boehms (1988), Biology, Austin Peay State University, Clarksville, TN 37040 (615/648-7781).

Nominating Committee for 1986—*Chairperson*: Charles E. Jenner, Biology, University of North Carolina, Chapel Hill, NC 27514 (919/962-1350); Grover C. Miller, Zoology, North Carolina State University, Raleigh, NC 27695-7617 (919/737-2588 or 737-2741); Dan K. Evans, Biological Sciences, Marshall University, Huntington, WV 25701 (304/696-3148).

Past-President's Council—*Chairperson*: J. Charles O'Kelley, Biology, The University of Alabama, University, AL 35486 (205/348-5960 or 553-1171).

Place of Meeting Committee—*Chairperson*: Michael J. Baranski (1986), Biology, Catawba College, Salisbury, NC 28144 (704/637-4442); James F. Jackson (1987), University of Southwestern Louisiana, Lafayette, LA 70504 (318/231-6756); Edward Croom, Pharmacy, University of Mississippi, Oxford, MS 38655 (601/232-7152).

- Priorities in Public Affairs Committee**—*Chairperson*: George A. Middendorf, III, Zoology, Howard University, Washington, DC 20059 (202/636-6964).
- Research Awards Committee-Faculty**—*Chairperson*: Michael R. Willig (1986), Biology, Texas Technological University, Lubbock, TX 79416 (806/742-2590); James W. Ross (1987), Biology, Benedict College, Harden and Blanding Streets, Columbia, SC 29204 (803/256-4220); Hazel R. Delcourt (1988), Botany, University of Tennessee, Knoxville, TN 37915 (615/974-3094).
- Research Awards Committee-Student**—*Chairperson*: Richard L. Buckner (1986) Natural Science and Mathematics, Livingston University, Livingston, AL 35470 (202/652-9661); Stewart A. Ware (1987), Biology, William and Mary College, Williamsburg, VA 23185 (804/253-4458); Frissell R. Hunter (1988), Biology, Savannah State College, Savannah, GA (912/356-2250).
- Resolutions Committee**—*Chairperson*: J. Charles O'Kelley, Biology, The University of Alabama, University, AL 35486 (205/348-5960 or 553-1171); Gerald Cowley, Biology, University of South Carolina, Columbia, SC 29208 (803/777-3167); Rowland M. Shelley, North Carolina State Museum of Natural History, P.O. Box 27647, Raleigh, NC 27611 (919/733-4093).
- Student Awards Committee**—*Chairperson*: Janice C. Coffey (1986), Science, St. Mary's College, Raleigh, NC 27611 (919/828-2521); Robert E. Daniel (1987), Biology, Murray State University, Murray, KY 42071 (502/762-2768); Kenneth W. McLeod (1988), Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29801 (803/450-2472).
- Editor, ASB Bulletin**—James W. Hardin (1986), Botany, North Carolina State University, Raleigh, NC 27695-7612 (919/737-2226 or 737-2727).
- Editor, News and Notes**—Jan R. Fortman (1989), Biology, Mississippi University for Women, Columbus, MS 39701 (601/329-4750).
- Archivist**—Madeline P. Burbank (1986), Box 15134, Atlanta, GA 30333 (404/373-1413).
- AAAS Representative (Section G)**—J. Marcus Safley, Soil Conservation Service, P.O. Box 2890, Washington, DC 20013 (202/447-3921).

MERITORIOUS TEACHING AWARD 1986

CALL FOR NOMINATIONS

(Deadline: February 1, 1986)

Through the prestigious annual Meritorious Teaching Award sponsored by Carolina Biological Supply Co., the ASB recognizes excellence in the teaching of biology by one of its members. The Teaching Award Committee asks that you begin to consider nominations for the 1986 award. If you know of a worthy candidate, please take time to make a nomination.

Nominees must be ASB members who are active or recently retired and who have taught biology in a southeastern institution for at least ten years. Among types of evidence of the qualifications of the candidate are the reputation of the candidate as indicated by recognition at his or her institution (important assignments and other contributions specifically related to effective teaching) and the quality of students for whom the nominee has provided inspiration for advanced study and careers in biology.

Nominators should complete the nomination form in the call-for-papers or the one below. Nominators should also obtain a recent curriculum vitae of the nominee, write a letter of nomination, and seek supporting letters from others. All this material should be sent by the nominator to the chairperson of the Teaching Award Committee (below). No supporting letters are to be sent directly to the committee chairperson.

Past and future unsuccessful nominees will not be reconsidered unless a new nomination is made. Nomination materials of unsuccessful nominees will be returned to nominators.

Dr. Robert B. Short, Chr. Merit. Teaching Award Comm.
Department of Biological Science
Florida State University
Tallahassee, FL 32306-2043
(904) 644-1735

NOMINATION—MERITORIOUS TEACHING AWARD 1986

NAME _____

ADDRESS _____

TEACHING INTERESTS _____

Name of Nominator _____

Address _____

Supporting documentation: _____ curriculum vitae
(enclosed) _____ letter of nomination
_____ supporting letters (no. _____)
_____ additional information not
in above

1986 RESEARCH AWARDS

The Faculty Research Award Committee requests that you begin planning to submit a paper for consideration for the 1986 Award. The prize is \$500, given by ASB. Three copies of the paper should be sent to Dr. M. R. Willig, Biology Department, Texas Technological University, Lubbock, TX 79416 (806/742-2590). The deadline is February 1, 1986, and only those submissions postmarked on or before this date will be considered. *Manuscripts should be written in a style and format appropriate for papers submitted for publication.* Papers will be read

by eminent scientists outside the Southeast who will judge them on originality, methodology, soundness of hypotheses and conclusions, and significance of contribution to your field. Papers will also be judged for clarity and completeness. Only papers that have not been published prior to the previous annual meeting will be considered. At least one author must be an ASB member in good standing, and the senior author must present the paper at the annual meeting.

The Student Research Award is also \$500, sponsored by Martin Microscope Company. The guidelines are the same as those for the Faculty Award stated above except the person presenting the paper must be a student at the time of presentation. Three copies should be sent, by February 1, to Dr. Richard L. Buckner, Department of Natural Science and Math, Livingston University, Livingston, AL 35470 (205/652-9661).

The Eugene P. Odum Award is for \$100 and a plaque, sponsored by the Southeastern Chapter of the Ecological Society of America, given for the best ecological paper presented by a student at the ASB meeting. The guidelines for this award were published in the April 1985 *ASB Bull.* (Vol. 32, p. 25) and will be in a forthcoming issue.

The North Carolina Botanical Garden, through the Southeastern Section of the Botanical Society of America and the Southern Appalachian Botanical Club, will present an award consisting of a \$100 cash prize for an especially meritorious paper presented in the areas of systematics, evolution, or ecology of vascular plants that are native or naturalized in the southeastern United States. Guidelines for this award will be in a forthcoming issue of the *ASB Bulletin*.

Plan now to present a paper at the 1986 meeting in Columbia, South Carolina, and take advantage of one, or several, of these awards.

POSTER SESSIONS

Poster sessions will be available for paper presentations at the 1986 ASB meetings in Columbia, South Carolina. The use of posters has become an increasingly popular means of scientific presentation at many national meetings. Poster sessions afford an informal opportunity for direct discussions between participants and attendees. All persons planning to attend the 1986 ASB meeting are thus encouraged to consider this option. Specific instructions for poster presentations will be included with the "call-for-papers" announcement in late summer. Abstracts for posters will be submitted and published in the same general format as past meetings.

NOTE—BILLING PROCEDURE

Starting last year the bills were sent to members with the **Call-for-papers**. However, many were overlooked. Please watch for these in August. There will be a note on the envelope to remind you!

NOTE—CHANGE OF EDITOR

The editorship of the **ASB Bulletin** will be vacant effective at the conclusion of next year's annual meeting. The new editor will assume responsibility starting with the July 1986 issue.

Those who wish to be considered for appointment as Editor are requested to submit a statement of interest and experience to Dr. Lafayette Frederick, Department of Botany, Howard University, Washington, DC 20059 by October 1, 1985.

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. R. L. Beckmann, Dept. of Botany, N.C. State Univ., Raleigh, NC 27695-7612.

Name in full _____ Date _____

Title _____ Department _____

Institution _____

City _____ State _____ Zip _____

Degrees (institutions and dates) _____

Recommended by member _____

Annual Dues: _____ Graduate student \$5.00 _____ Regular \$10.00
 _____ Contributing \$12.00 _____ Sustaining \$25.00
 _____ Family \$12.00 _____ Library subscription \$12.00

Book Reviews

Schwartz, F. J. 1984. **Sharks, Sawfish, Skates, and Rays of the Carolinas.** Illustrated by Leslie M. Vorgetts. Special Publ., Institute of Marine Sciences, Univ. North Carolina, Morehead City, NC 28557. Paperback 101 pp., available from the author at \$4.50.

Fifty species of sharks and 34 species of sawfish, skates, and rays are each discussed by seasonal movements, range, size, and depth preference. Visual and dichotomous keys help the reader to readily identify each species. Additional comments treat fossil sharks, teeth, local shark and ray studies, shark attacks, as well as overviews of studies and fisheries-related aspects of each species found off the Carolinas. A glossary and extensive literature cited section completes the volume. (*the author.*)

Sandved, Kjell B. and Ghilleen T. Prance. 1985. **Leaves.** Crown Publishers, Inc., New York, NY. \$35.00. 244 pp., hardcover.

It is unusual to have a popular book written about a single plant organ, besides flowers of course about which there are hundreds. The leaf is by far the most diverse as well as the most photogenic of the vegetative parts; thus the perfect topic for the combined talents of a nature photographer of the Smithsonian Institution (Kjell Sandved) and a botanist of the New York Botanical Garden (Ghilleen Prance), both with extensive experience in the tropics from which most of the illustrations are taken. The first and lasting impression of this book is the magnificent color photography (some three hundred full color photos many of which occupy the full 10 × 10 inch page size), beautifully reproduced on heavy glossy paper. These have been arranged into over twenty chapters, accompanied by a short text, covering a diversity of topics such as basic structure and function; shapes, venation, margins, and hairs; adaptations such as variegated, floating, succulent, and carnivorous; plus examples of several leaf-insect relationships. There are also chapters on leaves as vegetative propagules, movement of leaves, uses by man, fossils, the herbarium and leaf collections, and photographing leaves.

The short text for each chapter is written primarily for the nature enthusiast and botany student. Unfortunately, there are many careless mistakes in the writing, and entirely too much teleology and anthropomorphism, I suppose to make it sound more readable and understandable by the non-professional. Botanists, however, will cringe when they read that "bladderworts eat small aquatic animals," "... leaves turn away from the sun to avoid too much sunlight," a tendril is "an effective way of ascent for plants that have chosen the climbing habit," corms are modified roots, thorns are often modified leaves, "it is the gametophyte [of ferns] which produces asexual organs . . .," and "seed plants . . . begin to appear . . . in early Cretaceous . . ." One also cringes even more at the thought of many readers believing all this. Even with these problems, the text is still informative and gives a good view, along with the illustrations, of the tremendous diversity and fascinating adaptations of leaves. (*Ed.*)

Moss, S. A. 1984. **Sharks—An Introduction for the Amateur Naturalist.** A Spectrum Book. Prentice-Hall, Inc., Englewood Cliffs, NJ. \$10.95. 246 pp.

Much to my surprise, S. Moss's "Sharks—An Introduction for the Amateur Naturalist" is more than just another jaws shark book. Moss treats sharks in a clear, concise, easy, and eloquent style of writing, free of scientific jargon or terminology in ten chapters: Sharks—the negatives; sharks—the positives; shark diversity and evolution; how sharks eat; shark senses; shark brain and behavior; swimming and body form; reproduction; osmoregulation; metabolism, and friends and enemies of sharks. Old, new, and yet unresolved information is interwoven so skillfully that you come away feeling you know sharks intimately.

Few omissions and errors occur in this easy to read book. You will be completely absorbed once

you begin reading it. Amateur naturalists and serious shark researchers alike should enter the world of sharks to learn that they can sense weak geomagnetic forces, have varied and remarkable reproductive strategies, are trainable, some even have intricate metabolic heating systems along with many other remarkable features and adaptations. You won't regret that action. (*Frank J. Schwartz, Institute of Marine Sciences, University of North Carolina, Morehead City, NC.*)

Thaxton, C. B., W. L. Bradley, and R. L. Olsen. 1984. The Mystery of Life's Origin: Reassessing Current Theories. Philosophical Library, 200 West 57th St., New York, NY 10019. 228 pp, illus. \$14.95 hardback, \$8.50 softback.

The authors are chemist, materials scientist, and geochemist, respectively. In this book they offer a thorough evaluation of the existing theory of prebiotic chemical evolution, by which is meant the formation of living systems by spontaneous chemical events involving inert substances found on the earth at the time of its formation. The general conclusion which they draw from their critique will be controversial: they find chemical evolution in the above sense to be a most implausible hypothesis. In reaching this conclusion they analyze and reject a number of crucial components of and evidences for the hypothesis. They consider that concentrations of reactants and destructive processes were probably such on the early earth as to make the concept of the "prebiotic soup" a myth. They decide that contemporary estimations make too short the time available for chemical evolution (about 170 million years). They infer that the early atmosphere was not strongly reducing, as commonly supposed, but at least neutral and more probably oxidizing, a condition which would render improbable the postulated syntheses of chemical evolution. They suggest that many simulation experiments which have been reported involve a degree of intervention by investigator intelligence which makes them illegitimate and their results irrelevant. From thermodynamic considerations they deduce that energy-flow through an open system quite easily accounts for the maintenance of life once formed, but cannot provide for its origin. They judge that even under non-equilibrium conditions the amount of selection and sequencing work required in the formation of proteins and DNA is too much: they find the configurational entropy change involved to be too great. Finally, they regard the "protocells" which have so far been experimentally produced to be completely inadequate models, since such entities display no truly cellular functions; those functions that do operate arise from simple physical forces. In the course of their discussion the authors develop two lines of analysis which appear to be new: a systematic attempt to construct formal criteria for acceptable degrees of investigator interference in simulation experiments (Chap. 6), and a more thorough thermodynamic examination of the problem of configurational entropy in coded macromolecules (Chaps. 8, 9). As remarked above, the general conclusion reached in the main body of the book is that "the undirected flow of energy through a primordial atmosphere and ocean is at present a woefully inadequate explanation for the incredible complexity associated with even simple living systems, and is probably wrong" (p. 186). The authors expect that few scientists working in this area will accept their conclusion easily, but they hope that it will be seriously considered rather than rejected out of hand. In an epilogue the authors examine available alternatives to the chemical evolution theory; these include a number of variants involving yet unknown natural laws, panspermia, and special creation. Their analysis causes them to choose as most plausible the hypothesis of the origin of life by action of a creator beyond the cosmos. This view may make militant mechanists bristle, for the authors openly characterize it as theistic, a fact underscored by their constant capitalization in the words "Special Creation" and "Creator." But they do not appear to attach their creator to any particular religion or subset of a religion; in particular, nowhere do they allude to fundamentalist-protestant creationism. And although their arguments might be taken to support the position that creation should be taught to beginners as an alternative to evolution, the authors do not explicitly advance this proposal. The book, especially the main part, should be examined carefully by specialists concerned with the origin of life, but many parts of it will also be of interest to scientists oriented more generally to that problem. Those with a bent toward the philosophy and methodology of science may find particularly interesting the discussion in the epilogue of the distinction between operation science and origin science, the role of plausibility in the latter, and the authors' view that admission of a God-hypothesis would pose no threat to science. (*James R. Troyer, Botany Department, North Carolina State University, Raleigh, NC.*)

News of Biology in the Southeast

Jon R. Fortman—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

Tuskegee Institute, Department of Biology. *Dr. J. H. M. Henderson* visited the Republic of South Africa on a Botanical Delegates Tour sponsored by the People-to-People Organization. He joined 33 other U.S. botanists and taxonomists who visited South African universities and experiment stations. Dr. Henderson gave a number of seminars during the tour on plant tissue culture of sweet potatoes. Dr. Henderson and his research technician, *Kathryn Reese*, attended the annual meeting of the Southern Section of the American Society of Plant Physiologists at LSU, where they presented papers on "In Vitro Culture of Sweet Potatoes."

Auburn University, Department of Botany, Plant Pathology and Microbiology. *John D. Weete* was appointed Associate Editor for the *Canadian Journal of Microbiology*. *Paul A. Lemke* was selected as Division Councilor of the Division of Fermentation and Biotechnology of the American Society for Microbiology. *Norman D. Davis* was elected to Fellowship in the American Academy of Microbiology. *Urban L. Diener* assisted the Ministry of Agriculture of the Royal Thai Government with a project on aflatoxin in corn, sorghum, and peanuts during a winter visit to Bangkok. *Richard M. Patterson* retired this year after 36 years of service at Auburn University. He was appointed an Assistant Agronomist in 1949, and in 1964 he began a joint appointment as professor and computer scientist in the Department of Botany, Plant Pathology, Microbiology, and the Computer Center. Since 1969 he has headed the Research Data Analysis Unit, and taught graduate and undergraduate courses in statistics.

Florida

University of Florida, Department of Botany. *Professor Leland Shanor* retired from active service on February 1, 1985. He will be appointed Professor Emeritus. *Professor John J. Ewel* has been awarded a Guggenheim Fellowship to complete his investigations in agroecosystems. During the next year he will be at the University of Cambridge, England, and at Stanford University in California. *Professor William Louis Stern*, Chairman of the Department, will step down from this position at the end of the summer semester, 1985, and return full time to teaching and research. Professor Stern is currently President of the Botanical Society of America. *Professor James W. Kimbrough* has been appointed a member of the Board of Directors of Highlands Biological Station. The department will hold its course in Tropical Botany at the Fairchild Tropical Garden in Miami during the summer of 1985. This is the fourth year of the program which has grown to capacity enrollment. *Dr. Walter S. Judd* is coordinator in charge of instruction.

University of Miami, Rosenstiel School of Marine and Atmospheric Science. *Dr. Alan Schneyer* (Ph.D. University of Miami) received the F. G. Walton Smith Prize of \$1000. The prize is awarded annually to recognize significant and original doctoral research at the School. Currently Dr. Schneyer is a postdoctoral fellow at the Albany Medical College at Union University. His research focused on the reproductive endocrinology of the bottlenose dolphin *Tursiops truncatus*. In recognition of their outstanding work in the field of biological oceanography, *Dr. Farooq Azam* of the University of California Institute of Marine Resources and *Dr. Trevor Platt* of the Bedford Institute of Oceanography were the joint recipients of the 1984 Rosenstiel Award in Oceanographic Science. The citation, medal, and cash prize were presented to both men in March 1985.

Georgia

Oxford College of Emory University, Department of Biology. *Dr. J. F. Landt*, Professor of Biology, was appointed Chairman of the Division of Natural Science and Mathematics for a term of three years.

University of Georgia, Institute of Ecology. *Dr. Frank B. Golley*, Research Professor of Ecology and Professor of Zoology and Environmental Design, is the new Director for the Institute. He first came to the University in 1958 and was the former Executive Director of the Institute. Golley succeeds *Dr. Eugene P. Odum*, the original director and its organizer from 1961. Prior to his appointment as Executive Director, Golley served as Director of the Savannah River Ecology Laboratory. From 1979–81, he spent a two-year's leave of absence directing the National Science Foundation's Division of Environmental Biology. He served as President of the Ecological Society of America in 1976, and most recently was appointed Secretary-General to the International Association for Ecology.

Georgia Southern College, Department of Biology. *Dr. James H. Oliver* and *Dr. Daniel V. Hagan* recently attended the XVII International Congress of Entomology in Hamburg, Federal Republic of Germany. *Dr. J. B. Claiborne* and *Dr. Daniel V. Hagan* participated in the International Congress of Comparative Physiology and Biochemistry held recently in Liege, Belgium. *Dr. Sturgis McKeever*, *Dr. Frank French*, *Dr. Daniel Hagan* and *George Magnon* participated in the 15th Annual Biting Fly Workshop at the International Center for Public Health Research (University of South Carolina). *Dr. J. Mat Pound*, *Dr. J. B. Claiborne*, and *Dr. William Alexander* were recently inducted into membership of Sigma Xi. *Dr. W. Keith Hartberg* was recently notified of his appointment to a three-year term as Chairman of the editorial board of the *Journal of the American Mosquito Control Association*. *Dr. Tim Spira* has recently joined the faculty as Assistant Professor. He previously held Post-doctoral positions at Ohio State University and the Smithsonian Institution. His research interests are plant-animal interactions, plant population biology, and reproductive ecology.

Louisiana

Louisiana State University, Department of Botany. *Dr. Thomas S. Moore, Jr.*, Chairman, has been asked to speak at a symposium at the annual meeting of The American Oil Chemists Society to be held in May 1986 at Honolulu, Hawaii. *Dr. James B. Grace* has accepted a position in plant ecology. *Dr. Grace* will be an Associate Professor, and is currently in the Department of Botany and Microbiology at the University of Arkansas. The department is seeking to fill a new position in plant cell biology/physiology and an instructorship in the general botany undergraduate teaching program. In April 1985, *Dr. Arthur Bell*, Director of the Royal Botanic Gardens, Kew, London, was a guest of the department. *Dr. Bell* has previously lectured at LSU, and has hosted several botany faculty during their research trips to London and environs. *Tom Moore* participated in a symposium of plant lipids at Neuchâtel, Switzerland. *Margaret Stones*, Australian botanical artist, has nearly completed a 10-year commission for LSU to produce 200 botanical drawings of native Louisiana plants, drawn from living material. Some of these have been exhibited at the Smithsonian Institution as well as other locations.

Louisiana Environmental Professionals Association, Metairie. The LEPA wishes to announce the Second Conference on Water Quality and Wetlands Management. The title theme for this conference is to be Estuaries. Papers deal with the following subject areas as they pertain to estuarine ecology: management programs, coastal erosion, dredging, seafood resources, impact mitigation, and energy resources development. The conference is scheduled for October 24–25, 1985. For information, contact: LEPA Conference Chairman, 4813 W. Napoleon Ave., Metairie, LA 70001.

Mississippi

Mississippi State University, Department of Biological Sciences. *S. Lee Timme* received funds to support his studies on tropical bryophytes. He is also a recipient of a pre-doctoral research fellowship offered by the department.

Gulf Coast Research Laboratory, Ocean Springs. The physiology section is participating in an International Collaborative Crustacean Nutrition Program being conducted simultaneously at 14 laboratories in the U.S. and eight foreign countries. *Dr. A. Venkataramiah*, physiology section head, is coordinating the GCRL research project. *Indo-Pacific Pipefish (Red Sea to the Americas)*, recently authored by GCRL senior ichthyologist *C. E. Dawson*, represents a "long, arduous, research process

which has produced an unparalleled publication in this field," said Dr. Harold D. Howse, GCRL director. Dawson, an internationally recognized marine ichthyologist, retired from the Laboratory staff in February 1985 after serving as head of the systematic zoology section and curator of the ichthyological research collection since 1969. His current publication is devoted to the 47 genera, 175 species, and 7 subspecies of pipefish found in freshwater, estuarine, and marine habitats in the Indo-Pacific region bounded by the eastern coast of Africa and the western shores of North and South America.

North Carolina

North Carolina State University, Department of Horticultural Science. *Dr. August A. DeHertogh* has been awarded the Dutch Ministry of Agriculture's Medal of Honor, only the second American to win the award. The medal was inscribed "In appreciation of 20 years scientific and practical work devoted to Holland flowerbulbs." *Mr. Bryce Lane* was elected to the NCSU Academy of Outstanding Teachers. *Dr. Joe Love* is President-elect of the Southern Region of the American Society of Horticultural Science. *Dr. L. George Wilson* was elected Chairman of the National Sweet Potato Collaborators Group for 1985. *Mr. J. C. Taylor* retired as Greenhouse Manager completing 34 years of service to NCSU. *Mr. Paul Lineberger* was appointed Greenhouse Manager and *Mr. Brian McCall* as Assistant Greenhouse Manager. *Mr. Owusu A. Bandele*, Ph.D. candidate, was awarded the 1985 Academic Achievement Award by the Association for the Concerns of Afro-American Graduate Students and the Society of Afro-American Culture. *Dr. Glenn O. Randall*, Professor Emeritus, died on December 17, 1984.

Duke Environmental Laboratories, Huntersville. Duke Power Company operated an experimental hypolimnetic aerator in Lake Norman in the summer of 1984. This small-scale demonstration model showed that an oxygenated cold-water refuge area could be created for striped bass, which are often stressed to the point of mortalities in southeastern reservoirs in late summer.

Appalachian State University, Department of Biology. *Dr. John Bond* has recently returned from a sabbatical at Salve Regina Newport College, where he has been working with the faculty to develop a catalog of exotic plants in the area and on campus. The following faculty have been added to the department: *Dr. Matthew Rowe* (Ph.D. University of California at Davis), Assistant Professor. *Dr. Rowe* is a behavioral ecologist. *Dr. Matthias (Skip) Sedivec* (Ph.D. University of North Carolina), Assistant Professor. *Dr. Sedivec* is a neurophysiologist and a former research associate at the State University of New York at Stony Brook. *Dr. J. Kenneth Shull* (Ph.D. Florida State University), Associate Professor. *Dr. Shull* was formerly Chairman of the Department of Sciences at Loyola University in New Orleans. His research and teaching interests are in cytogenetics.

University of North Carolina, Institute of Marine Sciences. *Dr. W. E. Fahy*, Professor and fish morphologist, retired in August 1984. *Dr. J. Wells*, a sediment geologist joined the staff as Associate Professor. *Dr. A. Shanks* arrived in October 1984 for a two-year post doctorate as Assistant Professor with interests in drift and survival of plankton. *Dr. C. Peterson*, Professor, spent December and part of January 1985 in India presenting papers on sea turtles at the Symposium on Endangered Marine Animals and Marine Parks, Cochín. *Dr. Frank Schwartz* traveled to Czechoslovakia and Russia as part of the U.S. National Academy of Sciences and eastern European Academics exchange programs where fish and fish hybridization studies were emphasized.

East Carolina University, Department of Biology. *Dr. Claudia L. Jolls* will teach the general ecology course at the University of Michigan Biological Station at Douglas Lake this summer. *Dr. Susan J. McDaniel* was elected President-Elect of the North Carolina Academy of Science at its annual meeting.

South Carolina

College of Charleston, Department of Biology. *Dr. Karen Grady* has joined the department as a plant physiologist. *Dr. Grady* came from the University of California at Berkeley. Her area of research interest is the developmental genetics of plants. The Charleston Higher Education Consortium Graduate Program in Marine Biology is presently searching for a new Director. *Dr. Charles Biernbaum* is serving as interim Director.

Tennessee

Vanderbilt University, Department of General Biology. *Dr. Robert Kral* has returned to campus after spending the Fall semester in Venezuela. He was part of an expedition for botanical collecting

in Cerro de Neblina, T. F. Amazonas. The expedition was sponsored through the American Government, the Venezuelan Government, and the National Geographic Society.

The University of Tennessee, Knoxville, Department of Botany. A course consisting of lecture-discussions and laboratory exercises in most aspects of plant cell and tissue culture will be held at the University of Tennessee, Knoxville, August 12–23, 1985. This course is designed for persons with a degree in science or experience in plant tissue culture who need a thorough knowledge of and training in plant cell and tissue culture. The fees for the course will be \$1100. For further information contact: Dr. Donald K. Dougall, Botany Department, The Univ. of Tennessee, Knoxville, TN 37996-1100 (615/974-2256).

Virginia

Christopher Newport College, Department of Biology. *Dr. Robert J. Edwards* and *Dr. Aletha S. Markusen*, Professors of Biology and Environmental Science, will retire in June 1985. The Department moved into its new building in August 1984. Laboratory space was doubled, and was designed for specific courses by members of the department.

University of Virginia, Department of Biology. *Dr. William S. Woolcott* is serving as the Environmental Consultant for the Virginia Electric and Power Co. at the Lake Anna power station. *Dr. W. John Hayden* and *Dr. Miles F. Johnson* of Virginia Commonwealth Univ. received a grant for a flora study of Richmond National Battlefield Park. *Dr. Charles R. Werth* is serving as Visiting Associate Professor during the spring 1985 semester and is teaching genetics and introductory biology. He is continuing his research dealing with the Appalachian *Asplenium* complex. *Dr. John Bishop* is doing research at the University of Washington while on sabbatical leave. *Dr. David W. Towle* has extended his sabbatical leave into a second semester and is continuing his research dealing with sodium transport in crustacean gills at the Duke University Marine Laboratory.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Florida

Marie Selby Botanical Gardens, Sarasota. The annual Greenhouse Clearance Sale will take place on Saturday, July 27, 1985, from 10 A.M. to 5 P.M. No admission will be charged and all of the Garden's attractions will be open in addition to the wonderful bargains.

In keeping with its goals of research and conservation, the Marie Selby Botanical Gardens in celebration of its tenth anniversary will hold a symposium entitled "The Biology of Tropical Epiphytes" on 19–21 September 1985 in Sarasota, Florida, USA. Invited and contributed papers will address botanical and horticultural topics pertaining to epiphytes, including their ecology, physiology, reproduction, systematics, conservation, micropropagation, and cultural management in glass houses and tropical botanical gardens. A large collection of living specimens of Orchidaceae, Bromeliaceae, Araceae, Gesneriaceae, and Pterophyta, as well as many other tropical vascular plants, is maintained at Selby Gardens. These collections will serve as a focal point for observation and discussion during the symposium. The symposium is open to all biologists and horticulturists interested in epiphytes. Persons interested in attending the symposium or receiving additional information should contact Dr. W. John Kress, Director of Research, The Marie Selby Botanical Gardens, 811 South Palm Avenue, Sarasota, Florida 33577, USA (813-366-5730).

Kentucky

The Kentucky Museum, Western Kentucky University. The museum has scheduled the third annual "Glorious Fourth of July From Bygone Years" for Thursday, July 4, 1985. The family day event will feature such activities as sack races, watermelon-eating contests, musical performances, and patriotic orations. The museum has also scheduled "Social Fabric: South Carolina's Traditional Quilts," a traveling exhibit from the McKissick Museum of The University of South Carolina, from July 23 through August 25, 1985.

The Museum of History and Science, Louisville. A Space Festival is planned for June 29 to September 3, 1985. The exhibit includes over 100 previously unreleased photos of NASA missions, sculptures of aliens, and computer programs simulating blastoff and flight conditions. Weekend ac-

tivities include a Sci-fi film festival, a “green tie” champagne opening, science fiction costuming demonstrations, classes in rocketry and alien maskmaking, and a panel discussion on the search for extraterrestrials.

Mississippi

Crosby Arboretum, Hattiesburg. The Arboretum has been invited to serve as ecology consultant for the development of LeFleur’s Bluff State Park in Jackson, Mississippi.

Mississippi Museum of Natural Science, Jackson. The Natural Area Registry Program was begun in August of 1984 with the goal of helping to maintain the full diversity of genetic variability and ecological relationships through voluntary protection by landowners of rare elements. *Susan L. Stevens*, Registry Director, will be contacting landowners throughout Mississippi.



The ASB

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COVER

Virginia creeper (*Parthenocissus quinquefolia*, Vitaceae) is a showy vine this time of the year after the leaflets turn to a brilliant scarlet or crimson. The woody vines have branched, disk-tipped tendrils which are positioned opposite the leaves. In such a sympodial axis, the tendril represents the stem terminus and continuation of the axis is axillary to the subtending leaf. Leaves that are not opposed to tendrils have an obvious axillary bud, whereas tendril-opposed leaves have none.

TIME AND PLACE OF FUTURE MEETINGS

1986 April 9-12	University of South Carolina, Columbia
1987	University of Georgia, Athens (50th Anniversary)

PATRON MEMBERS

Carolina Biological Supply Co., Burlington, NC
Martin Microscope Company, Easley, SC

Association Affairs

50-YEAR HISTORY OF ASB

The annual meeting in 1987 will mark the 50th anniversary of the Association of Southeastern Biologists. The *ASB Bulletin* will publish a history of the Association which is now being written by Dr. Walter S. Flory.

Illustrations (black and white, glossy prints, approx. 4 × 5 inches, unmounted) of officers, field trips, etc. are needed. People and the year taken should be identified as appropriate.

Members are also encouraged to send in one or more, short (250 words or less) "I remember . . ." paragraphs recalling a special, memorable event, talk, field trip, significant experience connected with the ASB, etc. These contributions will be most useful and appreciated.

Please send all materials to Dr. Walter S. Flory, Department of Biology, Wake Forest University, Winston-Salem, N.C. 27109.

ACTIVE MEMBERS SHOULD:

- Note the 1986 billing envelope enclosed in the Call-for-Papers which you should have received in August. Please pay your dues now, if you have not already done so.
- Check the Call-for-Papers for all deadlines related to the 1986 meeting.
- Send in nominations for officers. This is your society.
- Nominate outstanding teachers for the annual teaching award sponsored by Carolina Biological Supply Company.
- Submit your paper for one of the research awards (see below)
- Send in a manuscript for publication in the *Bulletin*.
- Encourage graduate students and new faculty to join the ASB.
- Encourage your institutional library to subscribe to the *Bulletin*.
- Adhere to the following deadlines for submission of all materials to the editor for publication in the *Bulletin*:

January issue—September 25

April issue—November 25

July issue—April 25

October issue—June 25

AWARDS

Several awards are presented each year at the annual banquet. **The Meritorious Teaching Award** is by nomination only—see the *ASB Bulletin* 32: 121–122 and the Call-for-Papers for details.

There are now **four research awards**. Plan now to present a paper at the 1986 meeting in Columbia, S.C., submit your papers for one or more of the awards, and take advantage of the cash prize and the prestige. See the *ASB Bulletin* 32:

122–123 and the January issue next year for the description of the different awards and specific guidelines for each.

The newest award is given by the North Carolina Botanical Garden, Chapel Hill. It will consist of a \$100 cash prize for an especially meritorious paper presented in the areas of plant systematics, evolution, species biology, or conservation and dealing with native or naturalized vascular plants of the southeast. The paper will be evaluated by a panel of judges at the time of presentation on the following points: (1) significance of ideas, (2) creativity, (3) quality of methodology, (4) validity of results, and (5) clarity of presentation.

**FORTY-SEVENTH ANNUAL MEETING
UNIVERSITY OF SOUTH CAROLINA
COLUMBIA, SOUTH CAROLINA
APRIL 9–12, 1986**

PLAN NOW TO ATTEND!

1. See "Call-for-Papers" for various deadlines. Title and abstract due November 1.
2. A ***pre-registration form*** will be in the January issue. Pre-registration will be advantageous in assuring reservations for special meals and events, eliminating long lines at registration, and in helping the Local Arrangements Committee to plan adequately for all activities. Pre-registration will be offered at a substantial price discount.
3. ***Lodging.*** The Carolina Inn (937 Assembly St., Columbia, S.C. 29201), located two blocks from the campus, will serve as meeting headquarters and host motel. A block of 100 rooms has been reserved at the special rate of \$52.00 per room, *one to four occupancy*. Details of other area motels and their rates will be given in the January issue.
4. ***Parking.*** Many motels are within walking distance of the campus. However, if you drive to the campus from distant accommodations, parking will be available in one or more peripheral lots.

News of Biology in the Southeast

Jon R. Fortman—*News Editor*
Division of Science and Mathematics
Mississippi University for Women
Columbus, Mississippi 39701

ABOUT PEOPLE AND PLACES

Alabama

Auburn University, Department of Botany, Plant Pathology and Microbiology. *Peter H. Raven*, Director of the Missouri Botanical Garden, St. Louis, presented the 1985 York Distinguished Lecture in conjunction with the spring meeting of the Auburn Chapter of Sigma Xi, May 14, 1985. Dr. Raven's address "Population, Poverty, and Ecology in the Tropics," followed his seminar "Biogeography of the Southern Hemisphere" given earlier that day on the Auburn campus. *John D. Weete* presented an invitational paper "Antifungal Azoles: C-14 Dimethylation Inhibition" in a symposium on lipid interaction among plants and their pests and pathogens at the American Chemical Society meeting. *Urban L. Diener* has been awarded a Fulbright Senior Scholar grant to lecture and conduct research on mycotoxins in food technology at the State University of Campinas, Brazil, during August–December 1985. Selection of Diener as a Fulbright Lecturer recognizes his pioneering research related to aflatoxin and the producing fungus *Aspergillus flavus*. *Paul A. Lemke* has been awarded a sabbatical leave for one year beginning March, 1985, to study in the laboratories of Dr. Douglas Wallace and Dr. Donald McCormick, in the Department of Biochemistry, Emory University.

Georgia

Columbus College, Department of Biology. *Dr. Van Grosse* has been promoted to Professor of Biology. He has been a member of the faculty since 1975.

Atlanta University, Biology Department. Several changes have been made in the curriculum to meet the challenge of the current revolution in biological research. The objectives are to develop the students' quantitative skills, to provide experience in the techniques of modern biology, and to develop the students' creative scientific thinking. New courses offered include molecular genetics, eukaryotic genetics, endocrinology, biochemical pharmacology, membrane biochemistry, recombinant DNA laboratory, and monoclonal antibody laboratory. Future plans are for the faculty to increase from the current level of eight to sixteen within five years. A major effort is underway to raise \$18 million for a five-story building which would house all the sciences.

Louisiana

University of Southwestern Louisiana, Department of Biology. *Dr. Edmund B. Stueben*, Professor of Biology and former head of the department, retired from the University after 31 years of continuous service. *Dr. Michael Melkonian*, Westfälischen-Wilhelms Universität, Münster, West Germany, will visit the University a number of times to work in *Dr. Keith R. Roberts'* laboratory on an NSF-funded project awarded to Dr. Roberts. *Dr. Diana Wheeler* has accepted a position in the department as Assistant Professor. Dr. Wheeler received her Ph.D. from Duke University and is currently in a postdoctoral research position at the Museum of Comparative Zoology, Harvard University. *Dr. Robert R. Twilley* has accepted a position as Assistant Professor. His Ph.D. was earned at the University of Florida and he is presently a Research Associate at the Horn Point Environmental Laboratories, University of Maryland. Several Ph.D. Fellowships will be available at the University for outstanding students in Biology for the 1986–87 academic year. These Fellowships carry a stipend of \$12,000, waiver of tuition and fees, and guaranteed on-campus housing if desired. No duties or services are

required. For more information write to the Department Head, Biology Department, P.O. Box 42451, University of Southwestern Louisiana, Lafayette, LA 70504.

Louisiana State University at Baton Rouge, Department of Botany. *Dr. Marshall Sundberg* has joined the department as an Instructor for the freshman program, and will coordinate lectures and laboratory activities for the introductory courses. The department will conduct a national search for a plant cell biologist/physiologist and, perhaps, for additional tenure track positions in botany. *Drs. Meredith Blackwell* (mycologist) and *David J. Longstreth* (physiologist) have been promoted to the rank of Associate Professor. *Dr. Russell L. Chapman* has been elected to a two-year term of office as Secretary of the Phycological Society of America, and represented P.S.A. at the Annual Meetings of the American Assoc. for the Advancement of Science, which took place in Los Angeles in May. *Dr. Thomas S. Moore, Jr.*, Chairman, has been appointed to an NSF Panel in Metabolic Biology. *Dr. Charles Stirton*, a plant systematist from the Royal Botanic Gardens at Kew, England, visited the department in June 1985. *Dr. Stirton* presented a seminar on "Magic Circles of Science—The Sociology of Research," which is the topic of a book he is currently writing. *Dr. Michael Melkonian* from the University of Münster, West Germany, presented a research seminar on "The Implications of Motile Cell Ultrastructure on Green Algal Phylogeny." During the Spring of 1985, *Margaret Stones*, a botanical illustrator at the Royal Botanic Gardens at Kew, England, completed another working visit to Baton Rouge, where she continued on a ten-year project in which she is illustrating the wildflowers of Louisiana. A limited edition print series of selected pictures has been sold out. She also showed her work in New Orleans at the State Museum and in Washington, D.C.

Mississippi

Gulf Coast Research Laboratory, Ocean Springs. GCRL is making a contribution to the advancement of cancer research through the development of a rapid, economical, carcinogen-screening system as part of a project funded by the National Cancer Institute and the U.S. Army. Researchers in three sections of the Laboratory are midway through the third year of the four-year program which is providing information about the toxicological, cellular, and biochemical responses of small laboratory-reared fish such as guppies, sheephead minnows, and Japanese medaka to a variety of chemicals. *Dr. William W. Walker* is responsible for rearing the test fish and administering and monitoring chemical testing. GCRL hosted 25 college field trip groups during the 1984–85 academic year, according to *Dr. David W. Cook*, Assistant Director for Administration and Academic Affairs. Colleges and universities from Mississippi, Louisiana, Missouri, Tennessee, Arkansas, Ohio, Iowa, Kentucky, and Illinois visited GCRL for periods ranging from a single day to a full week. U.S. Secretary of Commerce Malcolm Baldrige has appointed *Dr. Thomas D. McIlwain* to the Marine Fisheries Advisory Committee. *Dr. McIlwain* is the Assistant Director for Fisheries Research and Management. The goal of the advisory committee is to ensure that national policies and programs are adequate to meet the needs of commercial and recreational fishermen, as well as environmental, state, consumer, and other related interests. *Dr. McIlwain*, who served as fisheries legislative assistant on the staff of Congressman Trent Lott in 1983, received his Ph.D. from the University of Southern Mississippi. The Laboratory has concluded an eight-month project which identified 7,215 Antarctic cumaceans, a type of crustacean, for the Smithsonian Institution. *Dr. Richard W. Heard, Jr.*, an associate biologist in the parasitology section, headed the project. He was assisted by *Sara LeCroy*, a graduate student at the University of Southern Mississippi, and biotechnicians *Gary D. Goeke* and *Cherie Snyder*.

North Carolina

North Carolina State University, Department of Horticultural Science. *Drs. E. Barclay Poling* and *Todd C. Wehner* have been promoted to Associate Professor. *Dr. Eric Young* is on leave for research on apple tree physiology with *Dr. O. P. Jones* at the East Malling Research Station, Maidstone, Kent, England. *Dr. J. C. Raulston* is an invited member of the 1985 U.S. National Arboretum Exploration to Korea. *Raulston* will be collecting germplasm for the NCSU Arboretum for potential introduction into the N.C. Nursery and Landscape industries. *Dr. C. R. Unrath* will be working on PP-333 response in apples with *Dr. Ali-El-Khoreiby*, who will be at NCSU for a one-year study leave from the Dept. of Horticulture, Suez Canal University, Egypt. *Dr. Frank. A. Blazich* was appointed to the Editorial Board of the *Journal of Environmental Horticulture*.

Wake Forest University, Department of Biology. The following members of the department were elected as officers of the North Carolina Academy of Sciences at the March 1985 meeting: *Dr. Ronald*

V. Dimock, installed as President; *Dr. Hugo C. Lane*, major adviser of the Collegiate Academy and member of the Board of Directors; *Dr. Robert L. Sullivan*, Treasurer. *Dr. Robert A. Browne* has been awarded a National Geographic Society grant to conduct field studies in North Africa, Spain, and Southern France for the period of July through September 1985. *Wayne L. Silver* has been appointed Assistant Professor of Biology. He comes from the Monell Chemical Senses Center, Philadelphia, Pa. He received his Ph.D. from Florida State University, and was a Postdoctoral Fellow at the University of Pennsylvania. His research specialty is chemoreception.

North Carolina State University, Department of Botany. *Dr. James W. Hardin*, Professor and Curator, and Editor of the *ASB Bulletin*, is now Editor-in-Chief of *Systematic Botany*, the quarterly journal of the American Society of Plant Taxonomists. He assumed these new duties on March 1. He will continue to be editor of the *ASB Bulletin* through the April 1986 issue.

Virginia

Lynchburg College, Department of Biology. *Dr. Gwynn Ramsey* stepped-down as Biology Department Chairman and has been succeeded by *Dr. Orrie O. Stenroos*.

ABOUT MUSEUMS AND BOTANICAL GARDENS

Kentucky

Museum of History and Science, Louisville. The Museum announced the receipt of a \$130,000 grant from NSF as part of a block grant of \$1,040,000 given to a consortium of eight science museums. The Louisville Museum's grant will fund the renovation of the first floor aerospace exhibit hall, and the development of the hands-on exhibit area on space age technology. A key aspect of receiving the grant was finding \$100,000 in matching funds. That was provided by Citizens Fidelity Bank.

APPLICATION FOR ASB MEMBERSHIP

Give copies of this to your students, colleagues, and your school librarian.

Fill out blanks and enclose check or money order for one year's dues and mail to Dr. R. L. Beckmann, Dept. of Botany, N.C. State Univ., Raleigh, N.C. 27695-7612.

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Institution _____

City _____ State _____ Zip _____

Degrees (institutions and dates) _____

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